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CONTENTS

Polyandry in the Oven-bird	Harry W. Hann	69
Light versus Activity as a Regulator of the Sexual Cycle in the House Sparrow	Gardner M. Riley	73
Further Notes on the Nesting Habits of the Virginia Rail	Henry Mousley	87
Washed Birdskins	George Miksch Sutton and William Montagna	91
The Birds of Anticosti Island, Quebec	Frank W. Braund and E. Perry McCullagh	96
General Notes		124
Editorial		127
Ornithological Literature		128
Membership Roll		132

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POLYANDRY IN THE OVEN-BIRD[1]

BY HARRY W. HANN

IN a previous paper (Hann, 1937) the author has described the usual habits of the Oven-bird *(Seiurus aurocapillus)* with respect to territory, mating, and care of the young, but a case has been observed recently which is so different from any known before that it seems worth while to describe it.

In the ordinary behavior of the Oven-bird the males and females have single mates, and the males chase all other males from their territory. Ownership of territory usually is respected by neighboring males, and an occasional chase in the right direction is all that is needed to keep the territory free from intruders. Copulation takes place between mates during the nest-building and egg-laying seasons only. After the young hatch the male aids with the feeding, and when the young leave the nest each parent takes a part of the brood for later care. The male remains in the home territory, unless it is late in the season, and the female goes into a neighboring territory, sometimes passing from one adjacent territory to another. Neighboring males are tolerant of these females and their young, and may take considerable interest in them, though the concern seems to be largely one of curiosity. Some exceptions to these rules were found previously when one male had two mates at the same time, and when a female copulated with two neighboring males in her own territory, then later visited a neighboring male in his territory during her incubation period. The case of the male having two mates may be attributed to an extra female entering his territory, and the behavior of the female perhaps to an over-supply of sex hormones. In the case which was observed recently a female had more than one mate, the condition known as polyandry, and this situation I will describe in some detail.

On May 30, 1939, I found an unfinished nest along the border of the territories of two males which I called Numbers 73 and 74. I considered the nest as belonging in the territory of 74 because a male had sung not far away in his direction, and twice when this male sang the female answered by chirping, once very sharply, as if reproving him for singing a song meaning "all's well" when the observer was near. On

[1] Contribution from the Department of Zoology, University of Michigan.

June 6, the day the fifth and last egg appeared, I found that Number 73 was singing near the nest, and at the same time Number 74 was singing at his usual post some distance away. I then changed my recording of the nest from file 74 to 73. Later I found that it belonged to both.

On June 19 when the young were two days old, I trapped the female and banded her, placing a metal band on her left leg and a black celluloid band on her right leg. I also trapped a male which proved to be Number 73, and banded him with a metal band on his right leg and a red one on the left. During the next morning as I was watching the nest I discovered that an unbanded bird was carrying food to the young, whereupon I trapped it on the following day, June 21. It proved to be a male, as indicated by the absence of a brood patch, and obviously was Number 74. I banded him with a metal band on the right leg, and a blue band just above it on the same leg, since another male in the woods had a blue band on the left.

These were complicated family relations, but more was to come. I already had noticed a male chasing the female and trying to copulate with her on June 20. After banding the second male I found that this intruder was a third male still unbanded, and apparently one that I had designated according to territory as Number 79. During the few days that followed while the young were in the nest, he entered the area repeatedly, sometimes coming within a meter of the nest. The banded males chased him when they found him, sometimes one following him and sometimes the other. Usually he went for some distance, but at other times merely dodged to one side, or even chased the 74 male. His interest centered chiefly in the female, but he probably was attracted to some extent by the nest and young, though he did not help feed them. He sang often in his territory, which lay to the west, and occasionally sang within fifteen or twenty meters of the nest, but since he did not come to the nest I had no chance to band him. Whether or not the female encouraged him in his attentions was a little uncertain. I did not see her actively invite his approaches as the females sometimes do, and usually she dodged him or turned and faced him causing him to retreat. He apparently was successful, however, in some of his attempts at copulation.

The two banded males continued to feed the young, and in fact did most of the feeding from the time I discovered the second male, three days after hatching, until the young left the nest. During the sixteen hours and thirty-five minutes that I watched the nest, Number 73 fed thirty times (42 per cent), 74 twenty-eight times (39 per cent) and the female fourteen times (19 per cent). Since the female usually brought small helpings, however, and 74's were a little larger than 73's, I think that 74 brought about fifty per cent, 73 forty-three per cent and the female seven per cent of the food.

The writer was anxious to see what distribution would be made of the young birds when they emerged from the nest, and fortunately was present when they left. At 8:37 A.M. on June 25, the first bird hopped from the nest and made its way south, and three minutes later all had left, one by one. None of the adults was at the nest at the time, but Number 73 discovered the first bird as he came with a mouthful of food. He apparently would have fed it, but the female arrived just then, drove him away and took charge of the young bird herself. I had to leave the blind to get a better view of what was going on, and this added to the usual excitement of leaving the nest, but probably did not influence the distribution of the birds. I could not see all that happened, but I noticed the female taking two birds to the west, incidentally toward 79's territory, and shortly afterward accompanying another down into the gully on the north. Later she returned to this last bird, led it on across to the other side and turned to the left. A couple of hours afterwards I found her bringing this bird back across the gully where she then had three young in close proximity. The Number 79 male did not try to get any young birds, but he followed the female continually as she led the young, often within a meter of her.

I was anxious to see whether the 74 male got any young as a reward for his work, but he succeeded in keeping well out of sight at the time. Two days later, however, I found him about seventy meters to the southeast, obviously in 73's territory, caring for a young bird. The female and Number 79 at this time were near where I had left them two days before, and while I was watching, he made an apparently successful attempt at copulation. I was unable to locate 73 that day, but four days later I found him seventy meters south of the nest in his own territory caring for a young bird. This made the disposal of the young quite certain; that is, the banded males got one young bird each and the female three. Quite evidently the female had to speed up her feeding to jump from seven per cent to sixty per cent, and at the same time give a good deal of attention to the Number 79 male, but I did not follow their later behavior to ascertain particulars.

In trying to analyze the causes which led to this peculiar family situation, one can get a little light from the previous conditions which to the best of my knowledge were as follows: The female presumably had been 73's mate at a previous nest about a hundred meters to the south, and started a nest here when her former eggs, in addition to two cowbird's eggs, were collected on May 29. Number 74 apparently was unable to secure a mate and was drawn over by the presence of the female. Number 79 is believed to be a male which had a mate and nest previously some distance to the southwest, but the female deserted the nest on June 10 during one of my experiments, and her later history is not known. The arrival of the male in the vicinity of this nest must have been at least several days after incubation began, and perhaps

after hatching, since he was not noticed until June 20 when the young were three days old. Just why he was drawn here is not clear, unless he received a little encouragement from the female. That the female may have been attracted by his attentions is indicated by the fact that she went directly to his territory when the young left the nest. As to Number 73, he must have been more tolerant than the average male, or he would have driven out his rivals.

Discussion

Mayr (1939) in a recent paper ably reviewed the question of sex ratio in wild birds and also its relation to mating. Polygyny, the mating of a male with more than one female, is the normal condition in certain species such as the Boat-tailed Grackle (McIlhenny, 1937), and happens occasionally among species like the Song Sparrow (Nice, 1937), which are usually monogamous. Polyandry is much less common, and according to Mayr is confined to such species as the phalaropes, in which the female takes the initiative in the mating activities. The last statement would not take into consideration such cases as the present one in which occasional polyandrous matings might occur among species with the usual habits of mating. Perhaps this condition is more common than has been supposed since it is difficult to detect. The question might be raised as to whether the presence of the extra banded male here was not "pseudo-polyandry," a term used by Mayr to describe cases where extra males merely help in the feeding. Though the two banded males were not observed copulating with the female, the presence of both near the nest was observed at egg-laying time, and probably both copulated with her. At least the relationship began early and was more deeply seated than just interest in the young birds. The unbanded male must have come on the scene later, and may be considered as an interloper, but nevertheless a mate also.

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LIGHT VERSUS ACTIVITY AS A REGULATOR OF THE SEXUAL CYCLE IN THE HOUSE SPARROW [1]

BY GARDNER M. RILEY

IT has been well established for the male House Sparrow, *Passer domesticus*, (Riley, 1936, 1937; Kirschbaum and Ringoen, 1936; Ringoen and Kirschbaum, 1939), as well as for a large number of other birds (literature reviewed by Rowan, 1938), that artificial lengthening of the daily period of wakefulness during the inactive phase of the sexual cycle results in a recrudescence of the gonads. It is generally assumed that the external factor exerts its primary effect on the anterior lobe of the pituitary, causing this gland to release the gonad stimulating hormones. This view is supported by the work of Benoit (1936) who found that hypophysectomized ducks did not respond to light treatment. It has also been reported (Benoit, 1935) that pituitaries from light-treated immature ducks stimulate ovarian development in the immature female mouse, whereas pituitaries from untreated ducks fail to bring about this response.

Two methods have been used to prolong experimentally the daily period of wakefulness. By the first method, and the one most commonly used, the birds are subjected to gradually lengthened daily light periods. In the second method, instead of increasing the daily illumination, a gradually increased period of enforced activity in darkness is added to a basic light day.

In the Junco (*Junco hyemalis*) Rowan (1929) observed gonadal recrudescence regardless of which method was employed. Appearing to corroborate this finding was the observation (Rowan, 1937) that Starlings (*Sturnus vulgaris*) collected within the city of London, where they are subject to frequent disturbances, approached the breeding condition almost two months in advance of country birds. More recently, in a brief note this author (Rowan, 1938*b*), announced that both House Sparrows and Juncos showed advanced gonadal development after subjection to increased periods of enforced wakefulness in total darkness, "following a preliminary training period of two weeks in a faint and continuously diminishing glow." On the basis of these observations Rowan advances the hypothesis, well stated in a recent review article (Rowan, 1938*b*), that "light is concerned only insofar as it provides a means of keeping the animals awake and physiologically active, but is in itself of no further significance, and that increasing diurnal activity induced by increasing increments of illumination, is the stimulating factor that activates the pituitary."

[1] Aided by grants from the National Research Council, Committee for Research in Problems of Sex; grants administered by Prof. Emil Witschi.

Bissonnette (1931), using the Starling, but otherwise following an experimental procedure very similar to that employed by Rowan, observed that increased periods of activity resulted in no increase in spermatogenic activity. As Rowan (1938) has already pointed out, however, this author's data do not indicate entirely negative results since the testes of two Starlings were described as being "enlarged considerably." In general, however, the gonads of Starlings subjected to increased exercise failed to show the recrudescence which uniformly followed increased illumination, leading Bissonnette to consider light, per se, as the essential external factor in the modification of the sex cycle.

In spite of widespread interest in problems relating to the factors controlling rhythms of sexual activity, it still remains an open question as to whether light or physiological activity is responsible for the seasonal activation of the bird pituitary. It was in an effort to provide further experimental data in support of one view or the other that an improved type of apparatus for enforcing activity was devised and the following experiments undertaken.

Material and Methods

An apparatus for insuring a constant state of wakefulness in complete darkness was constructed from a metal drum similar to the common oil drum 34.5 inches in length and 23 inches in diameter (Fig. 1).

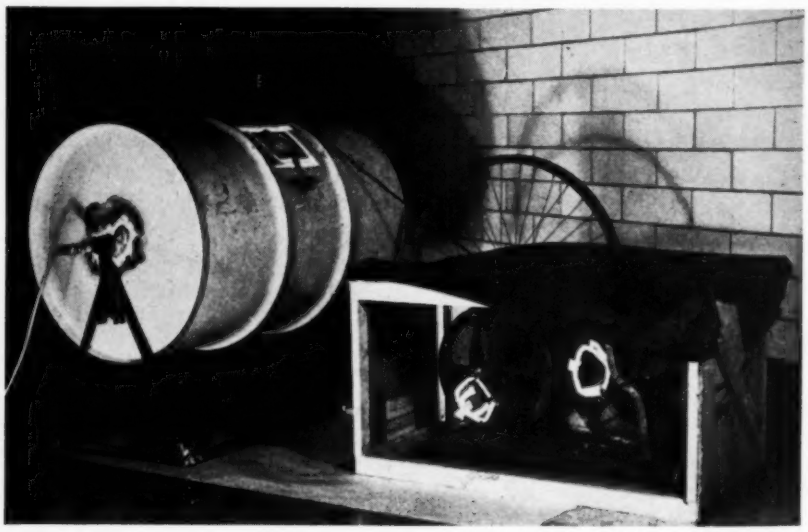

Fig. 1. Photograph of the apparatus used to enforce wakefulness in complete darkness.

The activation chamber was equipped with axles and mounted on a metal frame. Access to the interior was made possible by a flanged door fitted to the wall of the drum. For ventilation a hole one-half inch in diameter was drilled at the base of each axle and an air line conducted through one of them. The apparatus was driven by an electric motor, the speed of rotation being regulated by a system of intermediate pulleys. In Experiment 3 two small wire-mesh exercise cages (6 inches wide by 12 inches in diameter) were added to the above described apparatus. These small cages were enclosed in a dark compartment, tightly sealed on five sides and covered with a double thickness of black sateen in front. In Experiment 3 light was added to the large activity drum. The cord for this light (60 watt bulb) was passed through the second vent at the base of the axle.

The House Sparrows were caught in barns located in the vicinity of Iowa City and kept in large stock cages in the laboratory until a few days before the start of each experiment. At this time the birds were laparotomized and the size of the left testis was determined by caliper measurement or the ovary inspected and compared with the stages described for the House Sparrow by Riley and Witschi (1938). With the exception of the periods when the activity-treated birds were in the revolving drum the birds were divided into groups of four or five and kept in wire cages, 10 inches wide, 13 inches high, and 20 inches long. Except where it is stated otherwise, the Sparrows were maintained on a diet of cracked corn. The food was removed from all birds at the end of the basic light day.

Bouin's fluid was used as a fixative in all instances and Heidenhain's iron haematoxylin as a stain for the testicular tissue.

Conditions and Results of Experiment 1

Thirty male sparrows were started in the first experiment on November 16, 1938. The birds were kept in a windowless room with a 100 watt bulb providing the source of light for a basic 9 hours. At the end of this time (5:00 P.M.) 15 birds were transferred to the drum and kept awake for an additional 7½ minutes. The drum rotated at the rate of one revolution every one and one-half minutes. The remaining 15 birds were left exposed to the light. Both motor and light were connected with the same automatic switch. At 8:00 A.M. the following morning, the light was again turned on and the birds in the drum were returned to the light-exposed cages. Each day until the termination of the experiment (December 31, 1938) this procedure was followed, the period of wakefulness always being increased an additional 7½ minutes.

At the termination of the experiment (46 days from the start) only 6 birds remained in the light-treated group while 13 remained in the activity group. Another bird in the latter group was healthy up to the

forty-third day of the experiment but was found dead, apparently as the result of an injury. The fifteenth bird in this group had been sacrificed earlier since there were indications of injury. The high mortality in the light treated group was due primarily to an eye infection which is known to affect House Sparrows in nature as well as in the laboratory.

From the third week on there was definite evidence of progressive testicular changes in the light-treated birds as evidenced by a progressive darkening of the bills. This change of bill pigmentation was in marked contrast to the bills of the activity-treated Sparrows which continued to retain the yellow color characteristic of the sexually quiescent male Sparrow (Keck, 1934). The findings at autopsy, summarized in Table 1, showed testicular enlargement in all light-treated birds, whereas the testes of activity-treated birds had remained the same size as they were at the beginning or had even regressed.

It is to be noted that the testis size attained by light-treated birds falls considerably short of that attained by the testis during the normal breeding season. It is also less than the average testis size (7.9 mm.) in four Sparrows that had been subjected to light treatment for 25 days just previous to the start of this experiment. There was one essential difference in the method of treatment of these birds as compared with that used in earlier experiments. Previously the birds were not on a basic light day but were exposed to daylight and the gradually increasing light intensities of morning. Whether these conditions offer more favorable conditions for such experiments has not yet been determined. It was with the intention of bettering the general environmental conditions, however, that certain changes were made in the second experiment.

Conditions and Results of Experiment 2

In the second experiment (starting January 8, 1939) the equipment was moved to a better ventilated room, well lighted by windows on one side. For the basic 9-hour day, the birds were in cages a few feet from, and facing these windows. At the end of the 9-hour day the birds to be kept awake by activity were transferred to the drum as in the previous experiment while the birds to be light-treated were moved to cages within a large metal tank, covered by black sateen. Thus both groups of birds were subjected to the same amount of handling and very similar environmental conditions at all times. Again, the source of the additional light was a 100 watt bulb, and the daily increment was 7½ minutes. The rotation of the drum, however, was only half as fast as in Experiment 1, making one revolution in three minutes.

In this experiment, the activity group of Sparrows consisted of 10 males and 10 females. Half of the birds, with the sexes equally divided,

TABLE 1

EFFECT OF INCREASED LIGHT AND ACTIVITY PERIODS ON MALE SPARROWS

Bird No.	Treatment	Period of experiment	Dimensions of left testis (mm.)		Volume[1] of left testis (mm.)		Final bill color
			Beginning	End	Beginning	End	
29	Light	Nov. 16–Dec. 31	2.0 x 1.5	3.3 x 2.0	2.4	7.1	Brown
36	Light	Nov. 16–Dec. 31	2.5 x 2.0	4.6 x 3.3	5.5	24.0	Blue
50	Light	Nov. 16–Dec. 31	1.5 x 1.0	4.0 x 2.8	0.8	16.5	Brown
810	Light	Nov. 16–Dec. 31	1.5 x 1.0	3.0 x 2.5	0.8	10.6	Brown
811	Light	Nov. 16–Dec. 31	2.0 x 1.5	4.2 x 3.2	2.4	22.6	D. Blue
844	Light	Nov. 16–Dec. 31	1.3 x 1.0	6.5 x 5.0	0.7	86.6	D. Blue
808	Activity	Nov. 16–Dec. 31	2.0 x 1.5	1.6 x 1.0	2.4	0.8	Yellow
812	Activity	Nov. 16–Dec. 31	1.5 x 1.0	1.2 x 1.0	0.8	0.6	Yellow
813	Activity	Nov. 16–Dec. 31	2.5 x 2.0	1.8 x 1.0	5.5	0.9	Yellow
814	Activity	Nov. 16–Dec. 31	1.5 x 1.0	1.5 x 1.0	0.8	0.8	Yellow
815	Activity	Nov. 16–Dec. 31	2.0 x 1.5	1.5 x 1.0	2.4	0.8	Yellow
816	Activity	Nov. 16–Dec. 31	1.5 x 1.0	1.6 x 1.0	0.8	0.8	Yellow
818	Activity	Nov. 16–Dec. 31	2.0 x 1.5	1.5 x 1.0	2.4	0.8	Yellow
820	Activity	Nov. 16–Dec. 31	1.2 x 1.0	1.4 x 1.0	0.6	0.7	Yellow
821	Activity	Nov. 16–Dec. 31	1.2 x 1.0	1.5 x 1.0	0.6	0.8	Yellow
822	Activity	Nov. 16–Dec. 28	1.2 x 1.0	1.2 x 1.0	0.6	0.6	Yellow
823	Activity	Nov. 16–Dec. 31	1.2 x 1.0	1.4 x 0.9	0.6	0.7	Yellow
824	Activity	Nov. 16–Dec. 31	1.5 x 1.2	1.3 x 1.0	1.1	0.7	Yellow
832	Activity	Nov. 16–Dec. 31	1.5 x 1.0	1.5 x 1.0	0.8	0.8	Yellow
842	Activity	Nov. 16–Dec. 31	1.8 x 1.0	2.0 x 1.0	0.9	1.0	Yellow
845	Indoor Control	Dec. 31	—	1.7 x 1.0	—	0.9	Yellow
847	Indoor Control	Dec. 31	—	1.4 x 0.9	—	0.7	Yellow
848	Indoor Control	Dec. 31	—	1.8 x 1.0	—	0.9	Yellow

[1] The formula $(4/3\ \pi\ Rr^2)$ for computing the volume of an ellipse was used with R representing the radius of the greatest diameter and r the least diameter.

were placed on the regular corn diet, while the other half were placed on a diet of egg, bread and milk. The light-treated group consisted of 10 males and 6 females. As with the previous group, half the males and females were fed corn and the other half the mixed diet.

Very soon after the start of the experiment it was noted that coccidiosis was prevalent in the stock of Sparrows and within 20 days, twelve of the activity-treated and five of the light-treated birds had died or were sacrificed because of such infection.

At the termination of the experiment on the thirty-fifth day, there were only 5 birds left in the activity-group and 8 in the light-group. At autopsy, the findings were in complete agreement with those of the previous series (Table 2). The bills of light-treated males had darkened in every case, whereas the bills of the two surviving males subjected to prolonged activity remained light. The testes of birds of the light group had increased in size and histologically exhibited a picture of progressive spermatogenesis. The gonads of birds in the activity-group remained unchanged.

With the females, neither increased light nor activity resulted in stimulation of the ovary. We have pointed out earlier (Riley and Witschi, 1938) that the female House Sparrow responds much less readily to light stimulation than does the male, so the present negative results are not surprising. Although the testis differences in the birds on corn and mixed diets are not great, more birds on the latter diet survived, indicating that its use was somewhat advantageous.

Conditions and Results of Experiment 3

In the third experiment, started March 4, 1939, the experimental birds were divided into three groups. One group of 8, 4 males and 4 females, was subjected to the conditions of the revolving drum plus light from a 60 watt bulb; a second group, 2 males and 2 females, was subjected to activity in darkness in the small activity cages, while a third group, 2 males and 2 females, received additional illumination (60 watt bulb) in the aforementioned tank.

Since the male Sparrows under natural conditions are approaching the breeding condition at the time when this experiment was begun, a careful selection was necessary. Only those males were used which had a light bill or a wide yellow base (indicating gonadal regression) and whose testes were small.

The results (Table 3) corroborate those of the previous experiments. The testes of all birds treated with light, regardless of whether they were subjected to the conditions of the drum or not, were all markedly enlarged (Fig. 2). Histologically, advanced stages of spermatogenesis were found in the testes of birds of both groups. The testes of two males (Fig. 2) which had been subjected to increased increments

TABLE 2

EFFECT OF INCREASED LIGHT AND ACTIVITY PERIODS ON SPARROWS ON DIFFERENT DIETS

Bird No.	Sex	Conditions of Experiment		Period of experiment	Dimensions of left testis (mm.) or ovarian stage		Vol. of left testis (mm.)		Final bill color[2]
		Treatment	Diet		Begin.	End	Begin.	End	
896	F	Act.	Corn	Jan. 8–Feb. 12	0[1]	0			Y
882	M	Act.	Mixed	Jan. 8–Feb. 12	1.6 x 1.0	1.8 x 1.2	0.8	1.4	Y
892	M	Act.	Mixed	Jan. 8–Feb. 12	1.5 x 1.0	1.5 x 1.0	0.8	0.8	Y
831	F	Act.	Mixed	Jan. 8–Feb. 12	0	0			Y
898	F	Act.	Mixed	Jan. 8–Feb. 12	0	0			Y
835	M	Light	Corn	Jan. 8–Feb. 12	1.5 x 1.0	2.8 x 1.5	0.8	3.3	Br.
853	M	Light	Corn	Jan. 8–Feb. 12	1.5 x 1.0	2.7 x 1.8	0.8	4.8	Br.
834	M	Light	Mixed	Jan. 8–Feb. 12	1.7 x 1.2	3.0 x 1.5	1.3	3.5	Bl.
874	M	Light	Mixed	Jan. 8–Feb. 12	1.7 x 1.0	3.0 x 1.5	0.9	3.5	Bl.
875	M	Light	Mixed	Jan. 8–Feb. 12	1.8 x 1.3	5.0 x 3.8	1.6	9.0	D. Bl.
880	M	Light	Mixed	Jan. 8–Feb. 12	1.3 x 0.9	3.0 x 2.0	0.5	6.3	Bl.
856	F	Light	Mixed	Jan. 8–Feb. 12	0	0			Y
894	F	Light	Mixed	Jan. 8–Feb. 12	0	0			Y
847	M	Control	Mixed	Jan. 8–Feb. 12	1.5 x 1.0	1.5 x 1.0	0.8	0.8	Y
854	M	Control	Mixed	Jan. 8–Feb. 12	1.8 x 1.0	1.8 x 1.2	0.9	1.4	Y
825	F	Control	Mixed	Jan. 8–Feb. 12	0	0			Y
827	F	Control	Mixed	Jan. 8–Feb. 12	0	0			Y

[1] Ovarian Stage 0 refers to the typical quiescent condition described by Riley and Witschi, 1938.
[2] In describing the bill color; Y = yellow, Br. = dark brown, Bl. = blue, D. Bl. = dark blue.

of activity in darkness remained small and showed no progressive spermatogenic changes. In no group did the females show an appreciable positive response, the ovaries and oviducts remaining at a stage comparable to that observed at laparotomy.

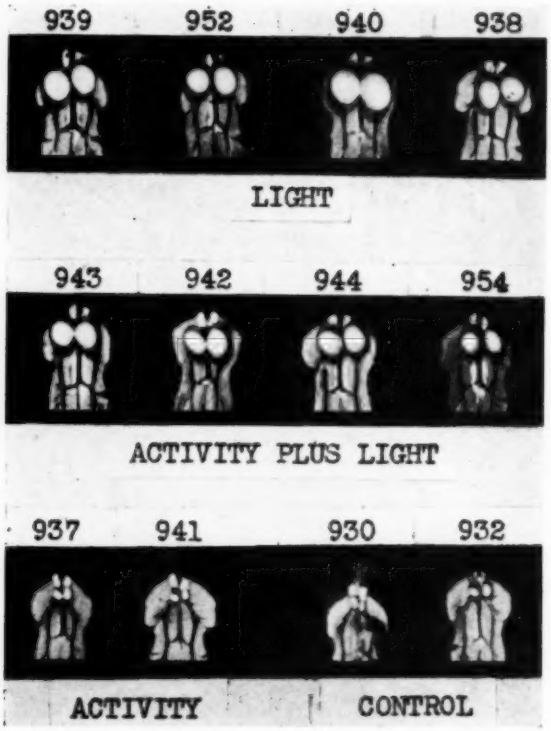

Fig. 2. The testes of experimental and control birds of Experiment 3 are shown. The gonads of all birds receiving light, whether alone or in combination with activity, show enlargement; those of activity-treated birds show the lack of any stimulation. Actual size.

Discussion

When the factors, light and activity, are completely separated there seems little doubt as to the importance of the former in stimulating testicular development in the House Sparrow. It is probable that the failure to separate these two factors may explain, at least in part, the results of previous workers. The six Juncos used in Rowan's original exercise experiment showed definite gonadal recrudescence, the testis of the last bird killed (after 42 days of treatment) measuring 3.4 mm. in length. In this experiment, light, though reduced to a minimum

TABLE 3

COMPARISON OF THE EFFECTS OF LIGHT, LIGHT PLUS ACTIVITY AND ACTIVITY ALONE ON SPARROWS

Bird No.	Sex	Treatment	Period of experiment	Dimensions of left testis (mm.) or ovarian stage		Vol. of left testis (mm.)		Final bill color
				Begin.	End	Begin.	End	
938	M	Light	Mar. 4–Apr. 8	3.0 x 2.0	4.2 x 3.3	6.3	23.8	Bl.
939	M	Light	Mar. 4–Apr. 8	2.2 x 1.8	4.5 x 3.3	3.7	25.5	Bl.
940	M	Light	Mar. 4–Apr. 8	1.7 x 1.2	5.5 x 4.5	1.3	58.5	D. Bl.
952	M	Light	Mar. 11–Apr. 8	2.2 x 1.3	4.2 x 3.2	1.9	22.6	D. Bl.
948	F	Light	Mar. 4–Apr. 8	I[1]	I			Y
949	F	Light	Mar. 4–Apr. 8	I	I			Y
927	F	Light	Mar. 11–Apr. 8	I	I			Y
934	F	Light	Mar. 11–Apr. 8	I	I			Y
942	M	Act. Light	Mar. 4–Apr. 8	2.2 x 1.4	4.0 x 3.0	2.3	18.9	D. Bl.
943	M	Act. Light	Mar. 4–Apr. 8	2.0 x 1.3	4.5 x 3.5	1.8	28.9	D. Bl.
944	M	Act. Light	Mar. 4–Apr. 8	2.7 x 2.0	4.0 x 3.0	5.7	18.9	Y. B.[2]
954	M	Act. Light	Mar. 11–Apr. 8	2.6 x 1.8	4.0 x 2.8	4.4	16.5	D. Bl.
946	F	Act. Light	Mar. 4–Apr. 8	I	I			Y
947	F	Act. Light	Mar. 4–Apr. 8	I	I			Y
950	F	Act. Light	Mar. 4–Apr. 8	0	0-I			Y
937	M	Activity	Mar. 4–Apr. 8	1.6 x 1.2	1.8 x 1.0	1.2	0.8	Y
941	M	Activity	Mar. 4–Apr. 3	1.6 x 1.0	1.5 x 1.0	0.8	0.8	Y
931	F	Activity	Mar. 4–Apr. 8	I	I			Y
953	F	Activity	Mar. 11–Apr. 8	0	0			Y
930	M	Indoor control	Mar. 4–Apr. 8	2.0 x 1.5	1.7 x 1.0	2.4	0.9	Y
932	M	Indoor control	Mar. 4–Apr. 8	2.8 x 1.8	1.8 x 1.3	4.7	1.6	Y
974	F	Indoor control	Preserved Apr. 8	—	0			Y
975	F	Indoor control	Preserved Apr. 8	—	0			Y

[1] Ovarian Stage I is characterized by an ovary somewhat enlarged over the quiescent condition with small follicles conspicuous on its surface.
[2] Y.B.=yellow base.

and described by the author as a "feeble glow," was necessary to prevent the birds from being killed by a moving bar and accompanying gearing. The control birds exposed to the same intensity of light but not subjected to enforced exercise showed no testicular development. The important difference between these two groups of birds appears to be the fact that the birds in the activity cage remained awake while the controls were "permitted to sleep." In other words, it is possible that the birds that were forced to remain awake were also able to perceive the feeble light present, while the sleeping birds, with closed eyelids and heads tucked under their back feathers, were subject to none of this additional light.

Again in Bissonnette's experiments we find that the "work cages remained in deep shade." Of a total of 12 male Starlings subjected to "increased muscular work," Bissonnette records that the gonads of two (treated from January 15 to April 15) were medium in size and further describes them as being "enlarged considerably." It appears surprising that after 90 days of "work" treatment the testes of these birds should be larger than those of a control bird. However, one would hesitate to give the same interpretation to these cases as was given to Rowan's results. Here a complicating factor is introduced since for the first 63 days of the experimental period the birds were subject to increasing day lengths (normal astronomical increase in day length), while for the last 27 days the birds were on a reduced and constant light schedule of 10 hours daily. Bissonnette suggests that the increase in testis size might have all taken place before the change in the light schedule was made. The absence of any appreciable stimulation in 9 other Starlings subjected to prolonged activity treatment, in spite of the fact that the experiment was not conducted in complete darkness, indicates that the Starling may require higher intensities of light than the Junco or, as already suggested by Rowan (1938a), negative reactions may be the result of unfavorable excitation of the birds.

It is not the purpose of this discussion to consider at length the subject of light intensity in relation to the sex cycle but certain observations are pertinent to the above considerations. Rowan (1929) suspected that his failure to get uniform results in his earliest experiments with Juncos was due to too low intensity of light. This was corrected in later experiments with more uniformity in results and led this author to express the view that an optimum light intensity was essential to keep the birds physiologically active and uniformly responsive (Rowan, 1938). On the other hand, Miyazaki (1934) described the Japanese practice of "yogai" whereby bird fanciers place a burning candle before their bird cages at the end of the day so that they might have singing birds during the winter holiday season. Certainly this is a response to a light of very low intensity. However, it does not mean that Rowan's conclusion was unfounded since the birds

in the "yogai" were household pets, and thus subject to more disturbance than isolated laboratory birds. It appears that if there is some outside disturbance or a mechanical means of keeping the birds awake, light of a relatively low intensity is sufficient to stimulate the pituitary; otherwise, the light must be sufficiently strong to act as a disturbing factor itself.

It is difficult to state what factor is responsible for the sexual precocity of the London Starlings as compared with country birds, since here again light and disturbance are not entirely separated. An interesting alternative to Rowan's explanation has recently been advanced by Bullough and Carrick (1939). On the basis of their observation these authors conclude that the majority of the country Starlings are of the migratory, continental type, whereas the London starlings are of non-migratory, British type. It is shown "that a difference exists between the time of onset of sexual activity in these two types of birds," the migratory group leaving England before the testes begin to enlarge but at a time when the permanent resident group has already become activated.

The significance of the results of the present study lies in the complete separation of the two factors, light and physiological activity. In our experience there is no exception to the rule that lengthened periods of wakefulness in darkness do not provide a stimulus for testicular development. On the other hand, when light is supplied to these "activity" birds, a similar testicular recrudescence takes place as in birds receiving the light treatment alone.

The question arises as to whether the strange conditions of the mechanical activator might not result in such a state of excitation that the bird would be in a physiological condition unfavorable to spermatogenic activity. In Experiment 3 with the Sparrows in the revolving activator lighted, it could be observed that some of the birds were more excited than is customary in the light experiments. This excitability and enforced activity, however, did not result in extraordinarily high body temperatures. The temperature of Sparrows in the three groups (light, light with activity, activity in darkness) ranged from 106° F. to 108° F. after three hours of treatment. During the day it is not unusual to record a temperature as high as 111° F. In birds asleep during the middle of the night it is about 104° F. (Riley, 1937). It is not probable that the activity birds were subject to fatigue since in spite of enforced periods of wakefulness considerable fat deposits were observed at autopsy.

The experiments of Benoit (1937) in which the duck pituitary was directly illuminated emphasize the importance of light as a gonad-stimulating factor. When light was projected through a glass rod to that part of the orbit that is closest to the pituitary, a strong gonad stimulation resulted after 20 days of treatment. On the other hand,

the response was negligible in ducks with an opaque rubber shield lining the orbit and subjected to a stream of light directed toward the region of the sectioned optic nerve and pituitary. All these birds were subjected to similar disturbing conditions, such as removal of the eyeball, manipulation of foreign objects within the orbit, and enforced immobilization, yet, only when light was permitted to penetrate to the region of the pituitary was gonadal stimulation observed.

Rowan (1938a and 1938b) suggested that the negative results which Bissonnette obtained with the Starling as compared with his own successful stimulation of Juncos may have been due to a difference in temperament between these two species. If the negative results observed in our present experiments are due to unfavorable excitation, then we must conclude that, in spite of such a condition, light is capable of stimulating the hormonal mechanism responsible for the progressive development of the testis resulting in spermatogenic activity and the release of the male sex hormone.

Conclusions

Rowan (1925, 1926) first brought out the fact that "light stimulation" brings about a precocious development of seasonal sex activity in some (possibly all) birds of the northern Temperate Zone. In an effort to elucidate further the mechanism of this effect the same author considered the possibility of such intermediate factors as increase in vitamin D supply (Rowan, 1931) or, later, of prolonged physiological activity. The first suggestion has been revived in somewhat modified form by Perry (1938). While Rowan had assumed that increased irradiation produced the vitamin in the oil of the plumage, Perry contended that it was in the food, also exposed to extra lighting, that this increase was effective. The latter alternative seems obviated through our experiments. All birds, whether finally showing enlargement of the testes or not, were fed only during the normal day, which was spent in stock cages under identical conditions. No lighting was given to the food of the "light" birds. Rowan's activity theory was opposed by Benoit (loc. cit.) and Bissonnette (loc. cit.). The present study also leads to the conclusion that the light stimulation of the hypophysis is independent of general physiological activity of the bird. The temperature readings suggests that it is even independent of the metabolic rate though it is not certain yet that light may successfully stimulate the hypophysis while the bird is sound asleep and its temperature at the usual accompanying low of 104° F.

Summary

1. A study was undertaken to determine the efficacy of two factors, increasing light and increasing activity periods, in producing an activation of the House Sparrow's pituitary.

2. The method of lengthening the daily light period was similar to that followed by most authors engaged in this work, i.e., the gradual lengthening of a basic light day with increments of electric light. For gradually increasing the daily period of activity, a revolving drum was used which forced the birds to remain awake in complete darkness.

3. The experiments were conducted during a period extending from November 16, 1938 to April 8, 1939. The duration of treatment ranged from 35 to 45 days.

4. Without exception the testes of Sparrows subjected to light treatment showed significant enlargement and progressive spermatogenic changes. A darkening of bill pigmentation accompanied the gonadal development. On the other hand, the bills of activity-treated males retained the light color characteristic of the sexually inactive male, and the testes remained in a quiescent state. The absence of any progressive spermatogenic changes was confirmed histologically.

5. A combination of forced activity and extra lighting stimulates the testes to a condition approximating that of the light treated birds.

6. In females neither increased light nor activity rations were effective in stimulating ovarian development.

7. The incomplete separation of the two factors, light and activity, is suggested as the possible explanation for the positive results of the enforced activity experiments of previous authors.

8. When the two disputed factors, light and activity, are completely separated there seems little doubt as to the importance of the former in regulating sexual activity in the Sparrow.

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FURTHER NOTES ON THE NESTING HABITS OF THE VIRGINIA RAIL

BY HENRY MOUSLEY

SINCE the publication of my paper on the Virginia Rail (*Rallus limicola*) in the *Wilson Bulletin* of June 1937, I have had further opportunities of studying the incubation period of this rail, having watched daily three further nests from their construction to the subsequent hatching of the young. The first of these later nests was discovered in 1938, situated nearly opposite the 1936 nest, only on the opposite side of the marsh just seventeen yards away. It was a much smaller and prettier nest, well concealed in a tuft of fine sedges, and I was fortunate in finding it in the making. The first egg was laid on May 13, and an additional one on every succeeding day—except the twentieth, which was very wet—up to the twenty-second, when the ninth and last egg was deposited.

It has been rightly said that it is very difficult to flush a rail and see it fly for any distance. This was the case in 1936, for I never saw the bird fly at all, but had plenty of opportunities of watching it sneak from the nest and either remain nearby or vanish in the cattails. In the present case, however, the bird allowed a very close approach before springing off the nest and flying to the end of the marsh, giving me an uninterrupted view of its manner of flight. It was not until June 8, very near hatching time, that the parent refused to fly from the nest, flushing along the ground and remaining nearby. I was hoping to obtain pictures of the young on the following day, but at 9 A.M. the eggs were still unhatched. I waited until about 2 P.M. but as there were still no signs of the young I left and returned early the next morning, June 10. On my arrival, five young had already left the nest, and a few hours later the four remaining eggs had hatched out and these young had also gone. There were no empty shells left in the nest. During the incubation period, I never saw more than one parent at or near the nest, but when the young had appeared both of them were constantly in view, calling continually to the now scattered young.

Since the above was written I have been fortunate in again (1939) finding in adjacent cattail marshes two more nests in the making, thus giving me further opportunities of checking my previous findings. One nest I found on May 13, the first egg being laid on May 20, the ninth and last, on May 28. The first chick appeared on June 15, 18 days after the laying of the last egg. The second nest was located on May 18, the first egg being deposited on May 22, and the ninth and last, on May 30. The first chick appeared on June 17, thus again giving a period of 18 days from the laying of the last egg.

The site of these two last nests formed an interesting contrast. No. 1 was in an open spot in the cattails (Fig. 1), while No. 2 was in another cattail marsh but located in a tuft of rushes at the foot of some willow bushes on the extreme edge of the marsh. As in the case of the nests of 1936 and 1938, only one bird was ever seen at the site until the eggs began to hatch, but thereafter both parents were in evidence, running excitedly about the nest within arm's reach.

When I visited nest No. 1 on the morning of June 15, three young had already hatched and left. On the following morning, five of the remaining six eggs had also hatched out, and the young—with the exception of one which was just emerging—had left the nest. The one

Figure 1. Nest of Virginia Rail in open part of the marsh. May 30, 1939.

remaining egg was addled. I was most fortunate in the case of this last youngster in obtaining a photograph (Fig. 2), showing the egg tooth, black band across the bill, and best of all, the tiny claw at the outer digit of the wing. It has been stated that the bill of these little glossy greenish-black chicks is scarlet, or orange-red, but at least in the early chick stage, I have always found it to be pinkish-white crossed by a black band. No empty shells were found in the nest.

Upon my visit to nest No. 2 in the morning of June 17, seven young had hatched out and two of them were still in the nest. The two remaining eggs hatched out the following day and the young had left

the nest when I arrived. In all four cases, the young have hatched out within a period of 24 hours. This nest was well concealed by the convergence of the rushes and willow boughs over the top. The parents behaved in exactly the same manner as in the previous cases, and likewise, there were no empty shells found in the nest.

Examining the facts obtained in these five intensive studies, we may conclude that the average period between the laying of the last egg and the appearance of the first young is 18 days, and in the case of the last young, 19 days. The 1938 bird was first found on the nest on May 21, the day before the laying of the last egg. Neither of the two birds in 1939 was found on the nest until the day the last egg was laid.

Figure 2. Young and egg of Virginia Rail. June 16, 1939.

In the *Auk* for October 1937, Dr. L. H. Walkinshaw says: "The eggs are laid as a rule, one each day, and are pipped for about forty-eight hours before hatching and all hatch out within a period of twenty-four hours, as a rule, for incubation does not start until the day before, or upon the day the last egg is deposited. The incubation period is twenty days. The young can swim and walk about almost immediately." Although Dr. Walkinshaw's study extended over a period of fourteen years (1920-1934), during which time 44 nests were examined, it would appear from the detailed list that only two of these could be checked very closely, and upon these two, apparently, the incubation period of

20 days was based, the period at all other nests being estimated. As will be seen, most of the findings at my 5 carefully checked nests agree with those of Dr. Walkinshaw, except in regard to the incubation period, which I find to be 19 rather than 20 days.[1]

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Notes on the Birds of Kentucky. By Alexander Wetmore, Proc. U.S. National Museum, **88**, No. 3089, 1940: 529–574.

This is the third of a series of papers on birds of the east-central States based upon data and specimens obtained by field parties of the National Museum. The work in Kentucky was done in 1938 and covers 167 forms. As in the case of the reports on the West Virginia and Tennessee collections already published, the author includes also other Kentucky specimens which are deposited in the National Museum.

On the whole the avifauna of Kentucky has northern affinities, but in some ten species both northern and southern races occur in the State. In eight other species both eastern and western races were found, at least on migration. The House Wren, however, is the only species which is recorded as having different races breeding in the eastern and western sections of Kentucky.

Dr. Wetmore includes taxonomic notes on several species. He is not able to recognize more than two races of *Vireo griseus* in the east, and he follows Ridgway's disposition rather than the later arrangement of Todd or of Oberholser. The Red-eyed Vireo and the Bronzed Grackle are treated as full species, and the name *Quiscalus versicolor* is again upheld for the latter. Oberholser's recent divisions of the Redstart into two races is considered unwarranted, but the author agrees with Oberholser in separating a western subspecies of the Swamp Sparrow. Todd and Sutton's recently described *Penthestes carolinensis extimus* is accorded recognition. The eastern forms of *Passerculus* are critically reviewed in the light of the recent monograph of this group by Peters and Griscom, with most of whose conclusions the author is in agreement.

As in the reports on West Virginia and Tennessee no attempt has been made to review the literature of the State or to present a complete list of birds already recorded, but in view of the paucity of published information on the distribution of birds in Kentucky, the paper is a very worthwhile contribution to the avifauna of the eastern United States. Its value is the greater since no other systematic ornithologist has critically studied subspecific variation in this area. Dr. Wetmore's careful work is of considerable importance to local students as well as to those of wider interests.—P. Brodkorb.

[1] I have read the note by Dr. H. B. Wood in this same number of the *Auk* (1937: 535–6) but I am afraid it contains too many assumptions to warrant our accepting its conclusions as to the exact incubation period of the Virginia Rail. The nest was not visited between May 13 (5 eggs) and May 25, yet the author assumed that the last egg was laid on May 16. What if the bird had missed a day in laying an egg as did one of mine? Again, the nest was not seen after June 1 until June 3, when it was found destroyed with only cold eggs and dead embryos left. Yet it was upon the problematical date of hatching of these embryos that he arrives at the incubation period of 20 days!

WASHED BIRDSKINS

BY GEORGE MIKSCH SUTTON AND WILLIAM MONTAGNA

ANYONE who has collected birds extensively in southwestern Pennsylvania or in the northern Panhandle of West Virginia knows only too well how badly soiled a bird may become. A Pittsburgh Hairy Woodpecker may become so black in winter that its wings lose their spots. The underparts of Carolina Chickadees in the Wheeling region may become so dirty that the breast and belly are as dark as the throat-patch. Nearly every Pittsburgh winter specimen of Downy Woodpecker in the Carnegie Museum's large series of that species is so soiled that it can instantly be picked out as a "Pittsburgh bird." Such specimens may be acceptable enough for certain studies. They can be measured. But what place have they in a taxonomic series where painstaking color comparisons must be made?

A few years ago the senior author made a special study of the Chickadees of the northern Panhandle of West Virginia. Believing the flanks of the Carolina Chickadee to be less bright than those of the Black-cap, and the edgings of the secondaries less strikingly white, he proceeded with his investigations, finding to his surprise and disappointment that, basing his decisions upon flank-color and distinctness of white wing-edging alone, he could not identify his birds. He learned in time that a four-syllabled "phoebe" call-note was characteristic of *Parus carolinensis,* while a two-syllabled call-note was characteristic of the other; that the tail of *carolinensis* was short in appearance, even in the field; that the "dees" of the *chick-a-dee-dee-dee-dee-dee* cry were apt to be more rapidly given in *carolinensis* than in *atricapillus;* but he utterly failed to find color differences that were constant and satisfying. In desperation he began *washing* thoroughly (in soap and water) all specimens collected, in the hope of finding what their true colors were. Eventually he amassed a considerable series of perfectly clean birds and found, again to his surprise, that the flank color in his winter Carolina Chickadees was nearly if not quite as bright as in the Black-caps, and that the white edging of the secondaries was equally distinct in the two forms.

This discovery led him to wash a series of *carolinensis* specimens collected near Thomasville, Georgia. The laundered Georgia birds, compared with laundered West Virginia birds, were distinctly *gray-winged. Parus carolinensis extimus* Todd and Sutton was straightway named as a new subspecies, with Bethany, Brooke County, West Virginia, as the type locality. The color characteristics of *P. c. extimus* were described as being very close to those of average *P. a. atricapillus.* And this was *known* to be the case, for most of the specimens used in making the comparisons had been thoroughly washed.

This Chickadee study led the senior author to investigate further the condition of material with which he was working. So confused was he by the dirtiness of most of the specimens collected along the Ohio

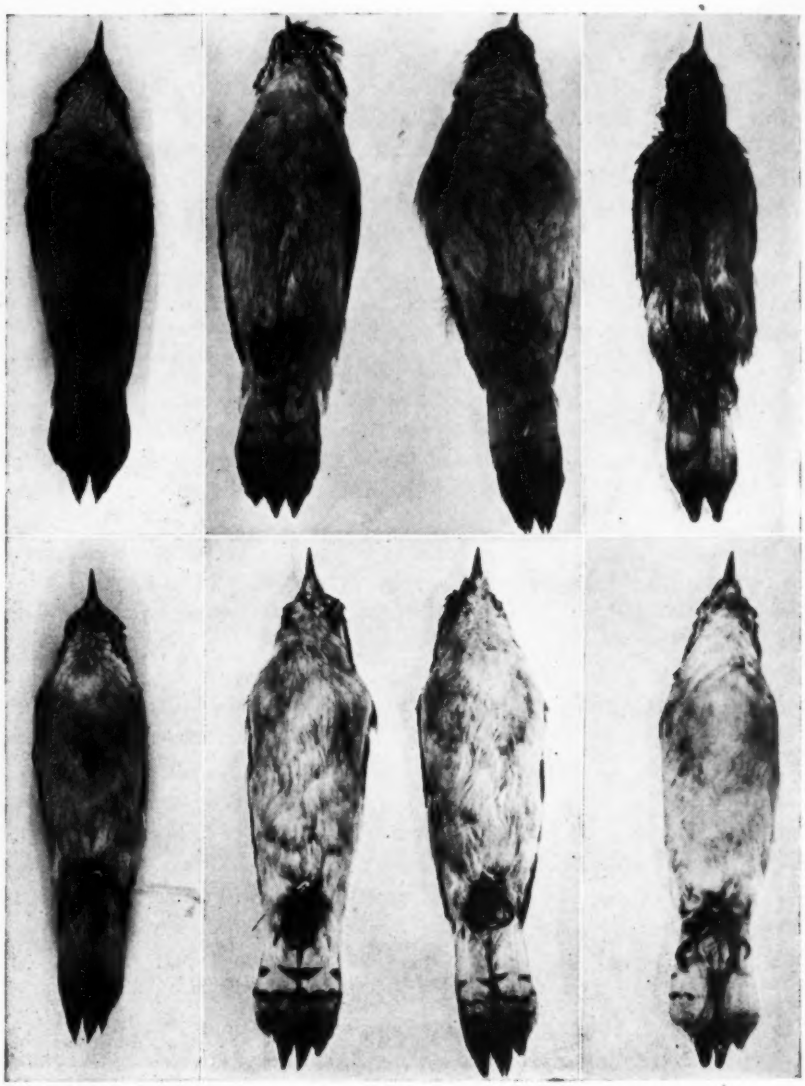

Figure 1. Upper row: Four Downy Woodpeckers, *Dryobates pubescens*, freshly collected, ready for washing and skinning.

Lower row: The same four Downy Woodpeckers, washed and prepared as skins by the iunior author.

River that he fell to washing every bird that he took. The results of this somewhat heroic treatment were astonishing. Dingy Baltimore Orioles emerged fluffy and brilliant, their gay colors completely restored. A breeding male Blackburnian Warbler (taken at Lake Terra Alta, Preston Co., West Virginia) that appeared to be abnormally dull, came out normally bright. Solitary Sandpipers that were gray-bellied came out white-bellied as they ought to be. Song Sparrows with vague chest-streaking came out clearly marked. After washing a hundred or so birds during the course of several seasons of study, he decided that thoroughgoing taxonomic work on upper Ohio Valley birds was utterly impossible without washed material. As a result practically the whole of his private West Virginia collection is washed—from kinglets and gnatcatchers to hawks and owls. With specimens of this sort in hand the various shades of grays or browns can be compared and described with some degree of assurance that their darkness is the result of feather-color rather than of dirt.

At Cornell University most locally collected specimens now being added to the Louis Agassiz Fuertes Memorial Collection of Birds are thoroughly washed before they are skinned. While the process is somewhat onerous and time consuming, the results are most gratifying. Mild soap is used in making a thick suds, the plumage is thoroughly washed and rinsed, and the specimen is dried before skinning begins. Cleaning a Hairy Woodpecker may require ten or fifteen minutes. But the time is well spent.

The Method

Several birds may be washed at the same time. If small, they must be washed soon after shooting even in cold weather, for the belly-skin quickly becomes tender. Suds may be made from Lux in hot water, then cooled to about the temperature of the hand before washing begins. Bloody birds should be washed *in plain cold water* until all clots are loosened and stains removed, before they are put into suds. Blood-covered plumage becomes heavily viscous in soapy water.

All the birds (the wet ones that have had the blood washed off, and the perfectly dry ones) are now put into the tepid suds, their mouths plugged thoroughly with non-absorbent cotton. They are washed by being moved rapidly back and forth held loosely in or under the fingers. Belly plumage of nuthatches, creepers, and woodpeckers sometimes must be rubbed between thumb and fingers until it is free of dirt. No part of the plumage can be neglected.

After the bird has been thoroughly washed it must be rinsed in clean, cold water. Two or three complete immersions are desirable. It may then be put on cheesecloth, on an old linen napkin, or paper toweling and gently blotted until no water drips from the feathers.

Next it is immersed in naphtha or carbon tetrachloride,[1] gently squeezed or "wrung out," and the blotting process is repeated. It is now ready for plaster of Paris. With the aid of an old tooth brush, it is put through this stage of the process quickly, the powder being dusted through the feathers until they are dry. The powder must be patted and shaken and blown out of the feathers. The specimen is taken outdoors, if possible. The plaster must be blown off thoroughly lest a "bloom" cling to the feathers.[2]

Now the bird is skinned. If certain shot wounds continue to bleed, corn-meal or plaster is liberally applied and the holes plugged with cotton. If an eye has been shot, the sclerotic fluid is blotted up by pressing the ball firmly from the outside with a plug of absorbent cotton. If, by the time the skin has been removed, certain parts are blood-stained, these parts must be washed again with plain water, carbon tetrachloride applied to hasten evaporation, and the damp plumage again dusted through plaster. Before the skin is stuffed the plumage must be pounded and blown free of plaster.

Shorebirds

A transient shorebird is fat. Its plumage usually is not dirty, however. If it is merely bloody, it may be skinned out *without preliminary washing,* carefully scraped free of fat, washed thoroughly in plain water, then plunged into naphtha or carbon tetrachloride, and finished with dusting through plaster. If its plumage is dirty as well as greasy, the well-scraped skin must be washed in thick suds, rinsed thoroughly, blotted inside and out, dipped into carbon tetrachloride, blotted again, treated inside with borax (or other preservative), then run through plaster. One difficulty with treatment of this sort is that the whole skin may be stretched a bit. If the bird is washed before skinning, the skin will not be pulled out of shape in the least.

Badly Shot Small Birds

It is occasionally necessary to preserve the skin of a small bird that has been very badly shot. The remark calls to the senior author's mind his first West Virginia specimen of Connecticut Warbler. This bird, collected at close range, was "all there," but it was exceedingly fat and its rear parts were so badly shot that by the time the skin was removed all the plumage was grease-soaked. Skins of this sort, though they appear to be hopeless, may be made into first-class speci-

[1] Carbon tetrachloride is expensive but non-inflammable. Its fumes are poisonous, so it should be used with care. However, the authors have used it for years, suffering no ill effects.

[2] Black birds such as crows and grackles rarely need a complete washing. If they need extensive washing their plumage should be dried with a fan if possible, the feathers being lifted and patted with a clean brush.

mens if they are immersed in carbon tetrachloride with great care, allowed to "soak" for a few minutes, then blotted, and run through plaster. If shot wounds need to be sewn up, the skin must be moistened with water before needle and wet silk thread are used.

Ducks

Ducks are rarely dirty, but they usually are fat. If most of the fat is removed by scraping with a scalpel or snipping with scissors, the skin may be immersed in carbon tetrachloride or naphtha for an hour or so (or all night!), then stuffed without being run through plaster. By the time the skin is finished the feathers will have become perfectly dry.

Caution

1. If it is not possible to wash a small bird soon after it is killed, better not attempt to give it a general washing. Especially is this true in hot weather. Specimens that are "slipping" cannot be washed without loss of many feathers.
2. A bloody bird must be washed *in plain cold water* first, then put into suds.
3. *Never* put a soapy bird directly into carbon tetrochloride. Thorough rinsing in plain water is very important.

Remarks

This question may well be asked: How can perfectly clean specimens be compared with anything but other perfectly clean specimens? The answer to this question may take the form of another such query as: How can we compare *any* two birds until we know exactly how much dirt is in their plumage? Much taxonomic work has been done in North America recently. Many new subspecies have been named and are being named. Is it not reasonable to suggest that this headlong rush be stemmed a bit, that more care be used in preparing material, and that absolutely clean birds be preserved? Once we have before us series of clean, well-prepared skins we will not need to resort to such time-honored phrases as "allowing for dirt," "disregarding this discoloration of the underparts" and so forth, and will know whether our winter Song Sparrows are brown-backed or gray-backed or, in fact, gray-brown in tone.

The authors wish to thank Mr. Charles S. Brand, volunteer associate in the Department of Zoology at Cornell University, who was good enough to photograph with great care the four Downy Woodpecker specimens before and after washing.

Cornell University, Ithaca, New York

THE BIRDS OF ANTICOSTI ISLAND, QUEBEC

By Frank W. Braund and E. Perry McCullagh

THERE has been but little study of the avifauna of Anticosti Island, partly because the ownership of the entire island was for many years vested in the Menier family. They used the island as a private game preserve, permitting only invited guests the privileges of the area. Since 1926 the Consolidated Paper Corporation has held title to Anticosti and has commercialized the natural resources.

A. E. Verrill (1862a) was the first to report on the birds of Anticosti, publishing a list of the birds he observed there in the summer of 1861. William Brewster (1884) accompanied Professor Hyatt on an expedition to the Gaspé and Labrador. En route they circled Anticosti and landed at various points, including Fox Bay. Dr. Joseph Schmitt (1904) was posted on the island from 1896 to 1904 and included an account of the birds in his monograph devoted to the island. Fortunately his many specimens were identified by the ornithologist C. E. Dionne of Laval University. Later (1920) Dionne himself published a paper on Anticosti birds based on the reports and specimens of Mr. Willie La Brie who lived on the island in 1913, 1916, and 1917. W. Sprague Brooks spent August 23 to September 15, 1919 on the island and later allowed Harrison Lewis to utilize his manuscript list. In 1920 Brooks published a description of the Anticosti representative of the Canada Jay, calling it a new species. Harrison F. Lewis (1924 to 1938) has published one excellent general account and several shorter contributions devoted to the birds of the island.

Personnel and Itinerary

Our party consisted of the authors; Dr. F. W. Merica, a surgeon of Cleveland; and Mr. Philip N. Moulthrop, assistant mammalogist of the Cleveland Museum of Natural History. Dr. Merica made the trip especially for the sake of the fishing but sometimes volunteered to assist. Mr. Moulthrop devoted himself largely to the preparation of specimens. Mammals, as well as birds were collected. The field observations were made principally by the authors of this paper.

We arrived on the island the evening of June 16, 1937 and made our base at Fox Bay until our departure on the afternoon of July 1. We secured the use of a large motor sailboat and made trips to points as much as 30 miles away. We would sail to a protected bay, collect two or three miles into the interior, and then return by boat. Braund and Moulthrop and two guides made a brief collecting trip to Eel Falls where they camped from midday on June 27 to early afternoon on June 29.

Anticosti Island

Anticosti Island is situated in the northern part of the Gulf of St. Lawrence, about 360 miles east-northeast of Quebec City, between latitudes 49° 4′ and 49° 53′ north and longitudes 61° 40′ to 64° 30′ west. It is about 135 miles in length and averages about 25 miles in width.

The island is largely of limestone formation, the whole shore being marked by broad curves and shallow bays. From the north coast near its west end and along the entire south coast, reefs jut out as far as 3 miles to sea. The south shore is low, rising gradually in successive terraces from a few feet to 400 feet in height. This terracing disappears toward the center of the island. Along the north coast the cliffs rise sheer from 50 to nearly 400 feet in height. In most places the cliffs are a few yards from the sea but are farther back from the shore behind the bays. Every few miles the cliffs project to form huge rounded capes of crumbling limestones undercut by the waves.

There are about 100 rivers and brooks on the island, none of them navigable. Some of these streams flow to the sea on limestone floors in a succession of beautiful falls and rapids. Others, such as Salmon and Fox Rivers, enter the sea in wider channels over beds of sand and gravel. Lakes occur at all altitudes. Some are arms of the sea cut off by bars, some are rock-floored pools, and others on the plateaus are boggy ponds.

The geology of Anticosti Island is especially interesting in view of the fact that the late Ordovician and early Silurian deposits are believed to be more complete here than anywhere else in America. According to Twenhofel (1928), the rocks which make up the island were laid down evenly in shallow and comparatively quiet waters as sedimentary deposits of ancient seas. The inorganic materials were apparently derived from the erosion of the Canadian shield on the north mainland. The strata dip slightly to the south.

Typical notes on the weather during our stay at Fox Bay read as follows: "June 22, temperature at 7 A.M. 40° F., strong northeast wind, rain and fog all day. June 24, temperature about 40° F. with strong north wind all day, foggy with rain in the morning, fog continuing all day. June 28, temperature at 7 A.M., 58° F., east wind with rain, clearing at 10:30 A.M., sunny in afternoon." Fog is apparently much more common at the east than the west end of the island. According to Twenhofel (1928), summer begins in May and ends in August. Snow falls in October. The average low temperature in winter is —4° to —13° F. and the highest temperature occurs in July, the maximum being 78.8° F., with the average temperature from the latter half of May to August about 50° F. Our guides told us they had seen ice packs closing the channel between the north of the island and the mainland of Quebec, a distance of about 20 miles at its narrowest portion, as late as June.

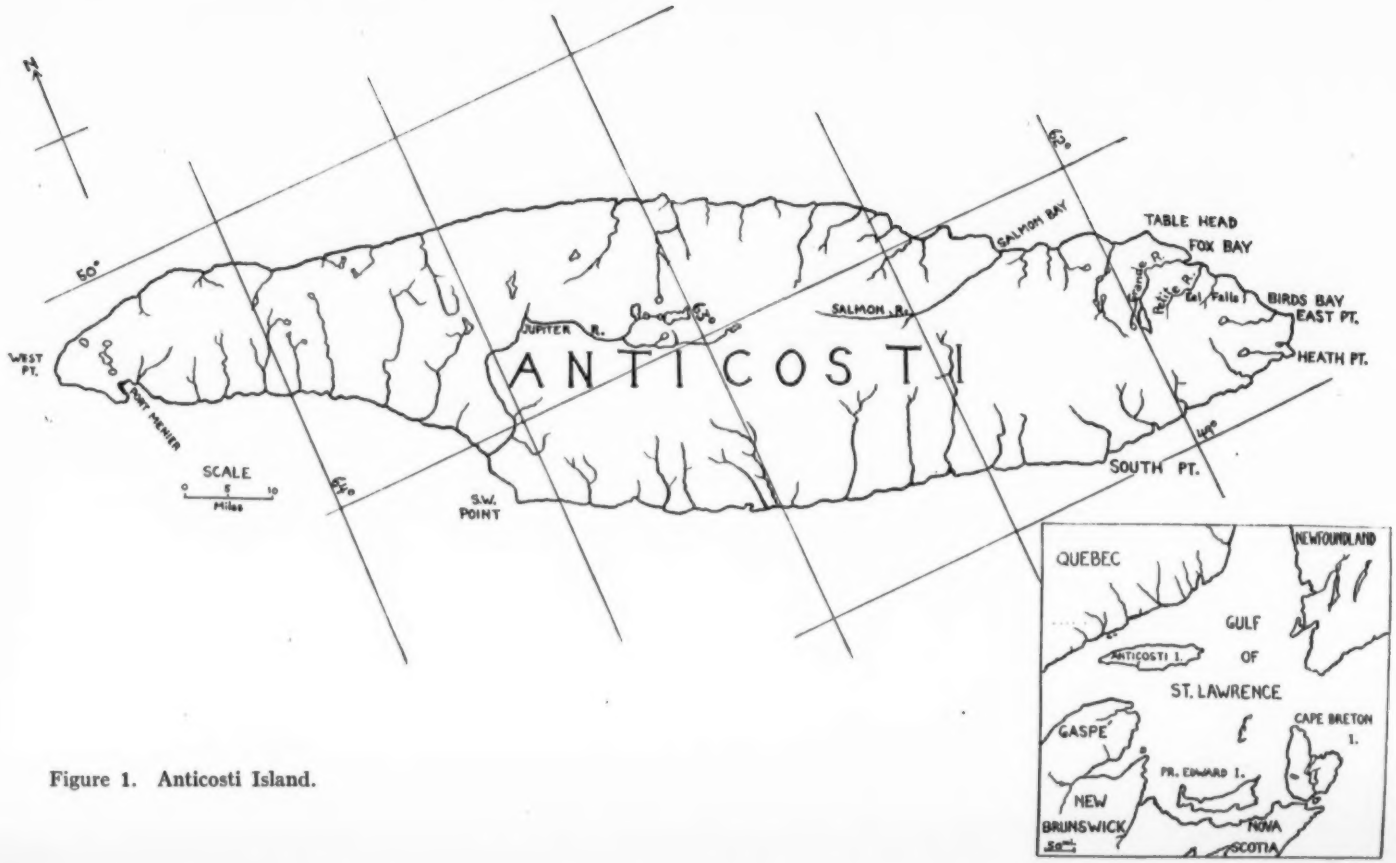

Figure 1. Anticosti Island.

Plant and Animal Life

Much of the island is forested, chiefly with spruce and balsam fir. There is, however, some white pine, American aspen, and balsam poplar. Here and there about Fox Bay willows may be seen and inland near Eel Falls an occasional mountain ash, tamarack, paper and yellow birch.

Small mammals, except the white-footed mouse (*Peromyscus maniculatus*), are scarce or entirely lacking. The guides believed they have seen an animal which answered the description of a shrew, but we found none. The mouse differs from the white-footed mouse found elsewhere and has recently been described by Moulthrop (1937). The Norway rat (*Rattus norvegicus*) and European house house (*Mus musculus*) have apparently come to the island on ships.

The larger mammals include hares, muskrats, foxes, possibly minks and martens, beavers, otters, moose, and bears. The white-tailed deer is extremely common. Reindeer and elk have also been liberated on the island. The reindeer may be increasing. Of these animals it appears that the only ones which are indigenous are the white-footed mouse, the bear, and the otter. Fishers and bison introduced by Menier are presumed to be extinct, as are also the martens and the wapiti. In the sea near Fox Bay we saw many seals which the guides called "Tête cheval," a large seal perhaps 10 or 12 feet long, and smaller seals which they believed to be of different species. The large seal has been identified by Newsom (1937) as the gray seal (*Halichoerus grypus*).

Many of the streams abound in salmon and trout. Cod are numerous and many halibut are caught about Fox Bay. Lobsters occur about the submerged reefs and there is a good daily catch at Fox Bay. The remains of a large cannery on the shore of the bay seems to indicate that the lobster is now less plentiful than formerly. Eels occur in the rivers. Frogs are present but there are apparently no snakes on the island.

Collecting Stations

Fox Bay Camp.—Fox Bay is a broad, shallow bay, a little over a mile in width and somewhat less than a mile in depth. It lies on the north shore of the island about 15 miles from its east end and faces the sea toward the northeast. Much of its water is no more than one to one and a half fathoms in depth. Its northwest and southeast extremities are marked by rounded points of land. The former shows the beginning of low cliffs but the latter, Reef Point, is backed by hilly land. From this point as its name suggests, a long reef extends and is marked by the waves which break over it. The shore is rough shale gravel, which along the whole mid-portion of the bay is thrown back into a round, even ridge 10 to 15 feet above the sea and 50 to 100 feet in depth. This is topped by deep coarse grass, blue iris, and dandelions and behind it a few small trees. Behind this ridge lies a broad, very shallow bay. Into

this bay at its northeast end enters "La Grande Riviére" and at its southeast end, enters "La Petite Riviére," surrounding a small island. To the east of the bay and behind it, the low land is forested in patches with spruce and balsam. Farther back, the land rises gently to small, boggy lakes. It was impressive to see a series of two or three such lakes within a few yards of each other, their water levels arranged like steps 6 to 10 feet in height. In these lakes we found the Great Black-backed Gulls nesting.

On the southeastern curve of the ridge around the bay stand two houses and a few small frame buildings. One of the houses is the home of M. Noel, a game warden, and the other, our headquarters, is a house built previous to 1900 by the government as a post for observers. Behind these houses the land falls away to a wooded meadow containing willows as well as evergreens. Farther back the trees are dwarfed, many spruces and tamaracks only a few feet in height surrounding low, wide areas of bog heath and sedge mat. Here the wet trail led between hummocks of moss covered with Labrador tea, azaleas, and blue-berries, among which grow several types of small flowers. These heaths called by the natives "les plains" are a mile or more in length and if one walks toward their centers the sedge mat quakes threateningly at the edges of black pools in some of which deer had drowned.

Traveling by boat southeast along the coast, we watched seals at play at the bases of the waterfalls and on the lower cliffs European Cormorants on their nests. About 6 miles from Fox Bay one may, by entering along a stream bed, gain the top of a cliff. Here we walked eastward along a rough trail which follows the telephone line surrounding the island. The trail passes through stands of spruce and balsam 20 to 30 feet in height, crosses small streams and traverses wide, boggy marshes which extend to the edges of the cliffs facing the sea. At the edge of this trail, we looked over Gull Cliff Bay to the nesting sites of thousands of sea birds. At the top of the long curve of the cliff we stood about 125 feet above the sea. The short, gnarled spruces were bent away from the sea, and here and there were the remains of Kittiwakes and Gannets which had probably fallen prey to foxes. Along this cliff by thousands the neat nests of the Kittiwakes were placed on the small ledges, most of them completely inaccessible due to the overhand of the cliff.

Eel Falls Camp.—Starting from the camp at Fox Bay we traveled southward. Behind the first long row of boggy "plains" the trail leads in the general direction of "La Petite Riviére" across wet wooded bogland. Following this rough trail for about four miles south of Fox Bay, we returned to the banks of the river and climbed upward to the lower margin of a heavily wooded ridge which rises sharply to a new plateau about 50 feet above. There we found that the little river pitched off a bench of rock into a neat cylindrical basin of limestone 25 to 30 feet

in height and 30 feet in diameter. Here hundreds of eels were clinging to the wet limestone beneath the falls to which they give their name. At a little distance from the falls near the edge of the stream we pitched our camp. This long ridge is thickly wooded with tall spruce, balsam, and birch. Southward above the ridge the land is flat again and leads away gradually to shorter trees and another series of long, open muskegs dotted with small lakes.

Acknowledgments

We wish to acknowledge the co-operation and suggestions of Mr. Harold L. Madison, formerly director of The Cleveland Museum of Natural History, and we wish to thank Dr. John W. Aldrich, Curator of Ornithology in the same institution, for his helpful advice during our preparation for the expedition and his assistance on the manuscript of this report. We are especially indebted to Dr. Harry C. Oberholser of the United States Biological Survey for many helpful suggestions as well as for comparison and identification of the specimens obtained and encouragement in the preparation of our data. We wish to acknowledge the courteous co-operation of Mr. Herbert W. Brandt in furnishing information regarding probable nesting sites and dates, and for the use of his cliff-scaling equipment which we found indispensable. Thanks are due to the Consolidated Paper Corporation for the privilege of collecting on Anticosti Island.

List of Birds

The following list includes the 179 species and subspecies which have been authoritatively recorded from Anticosti Island. In a number of cases we have used the scientific names recently advocated by Dr. Oberholser (1938). New subspecies of *Penthestes atricapillus*, *Certhia familiaris*, and *Geothlypis trichas* are described in this paper. Our specimens are deposited in The Cleveland Museum of Natural History.

As Lewis (1926:179) has pointed out, Ellis Bay of earlier authors is now called Port Menier.

Gavia immer immer (Brünnich). Common Loon.—Lewis (1924) observed this loon "rather commonly at Ellis Bay." Verrill (1862a) lists it as "very common." Brewster (1884) says "of general distribution along the Gulf." Schmitt (1904) found newly hatched young July 7, 1901.

We found this loon common along the coast, feeding in the calm salt water bays as well as inland on the larger muskeg lakes. From 2 to 10 individuals were seen almost daily at Fox Bay and Eel Falls between June 17 and 30.

Gavia stellata (Pontoppidan). Red-throated Loon.—Verrill (1862a) says "very common, breeds." Brewster (1884) saw the Red-throated Loon on Anticosti. Schmitt (1904) found it "fairly common." Dionne (1920) also reported it very common. Lewis (1938b) writes that he saw two adult Red-throated Loons with one downy young bird July 15 in a pond near Port Menier and an adult and young the next day in another pond.

We found one individual on June 23, two miles east of Fox Bay.

Colymbus auritus (Linnaeus). HORNED GREBE.—Schmitt (1904) says a young specimen was killed in October at Sanatorium Bay at the west end of the island. Dionne (1920) saw two in 1916. Brooks (1919) saw a female with three downy young on Lake Gamache. Lewis (1924) observed several pairs at Ellis Bay.

Puffinus griseus (Gmelin). SOOTY SHEARWATER.—Schmitt (1904) says of this species that it is rather rare in summer, being seen sometimes offshore from the island.

Oceanodroma leucorhoa leucorhoa (Vieillot). LEACH'S PETREL.—Verrill (1862a) often saw these petrels about Anticosti but found none breeding. Schmitt (1904) lists them as rather common in summer.

Oceanites oceanicus (Kuhl). WILSON'S PETREL.—Brewster (1884) found this species common and of general distribution. Schmitt (1904) considered the species rare and very irregular in occurrence.

**Moris bassana* (Linnaeus). GANNET.—Verrill (1862a), Schmitt (1904), and Dionne (1920) report this bird as common at Anticosti Island, while Brooks (1919) saw a number flying off Ellis Bay and was informed by M. Gagnon that a colony bred at Wreck Bay at the east end of the island. In 1923 Captain Oscar Mercier (Lewis, 1924) stated that he believed that Gannets had nested on the high Gull Cliffs between Heath Point and Fox Bay during all of his ten years experience in the region.

We found the Gannet rather abundant along the north coast of the island, feeding off the capes from early morning to late evening. Though the cliffs west of the Fox Bay Camp were about the same elevations as those to the east of the bay the birds were confined to the latter location where there was a concentration in two large colonies at Gull Cliff Bay. The precipitous cliffs in this area are about 200 feet high with narrow jutting ledges of limestone 3 to 4 feet wide, and 10 to 30 feet below the sod-covered top. Here, with thousands of Kittiwakes, Murres, Puffins, Guillemots and Razor-billed Auks, were nesting approximately 500 Gannets. The nests were untidy, wet, foul-smelling masses of seaweed and kelp with a few tufts of moss and grass. Their total depth was from 6 to 8 inches and their diameter 24 inches. The edges of the nests hung loosely over the ledges. In the center of the mass was a poorly defined depression, 4 to 6 inches in diameter, in which were laid single, deeply stained, reddish brown eggs. The occasional fresher egg was grayish white. Eggs collected from eight of these nests on June 27 ranged from fresh to two-thirds incubated. The same day there were many more young in the nests than eggs. Most of the adults refused to leave their nests, even when we descended with rope and steel ladder to within a few feet of them. Throwing bits of rock was not enough to dislodge them. Many of them moved awkwardly about their nests in mild excitement, making a guttural grunting sound. While so doing one individual disgorged a large half-digested fish.

**Phalacrocorax carbo carbo* (Linnaeus). EUROPEAN CORMORANT.—The status of this species seems to have varied in the past. Verrill (1862a) reports, "breeding in large numbers on cliffs at East Point." Brewster (1884) found a breeding colony of about 20 nests at Wreck Bay. Schmitt (1904) found it especially in the eastern part of the island at Fox Bay. In contrast to these observations, Lewis (1924) reports, "the present status of this species on Anticosti is uncertain, but it is probable that some breeding colonies still exist there." Oliver Austin, Jr. (1932) states, "the European Cormorant formerly bred south to Newfoundland, the Gulf of St. Lawrence, and the Bay of Fundy. A few are still reported to breed in the Gulf of St. Lawrence." On June 20, six miles east of the Fox Bay camp, we collected two and observed hundreds of European Coromorants in company with Kittiwakes and Murres nesting on the ledges of the cliffs. The cliffs in this area varied in height from 100 to 300 feet. In the Salmon River

* We have marked thus all species of which our party collected specimens.

district, 36 miles west of the Fox Bay camp on June 26, a second colony was observed. The nests of sticks, kelp and other sea-weed contained well-developed young on June 20 and 26.

Phalacrocorax auritus auritus (Lesson). DOUBLE-CRESTED CORMORANT.—Schmitt (1904) says that this cormorant nests on the island and is fairly common in summer; Dionne (1920) found it fairly common.

Ardea herodias herodias (Linnaeus). GREAT BLUE HERON.—Verrill (1862a) saw what appeared to be a Great Blue Heron at Ellis Bay. Schmitt (1904) lists it as rare, one collected at Ellis Bay. Dionne (1920) saw only one on the island.

Botaurus lentiginosus lentiginosus (Montagu). AMERICAN BITTERN.—Verrill (1862a) caught a young bird August 4. Schmitt (1904), Dionne (1920), and Brooks (1919) report this species common.

We saw an American Bittern June 23, two miles east of Fox Bay.

**Branta canadensis canadensis* (Linnaeus). COMMON CANADA GOOSE.—Verrill (1862a), Brewster (1884), and Schmitt (1904) found this species common and breeding. Lewis (1924) saw 16 at Ellis Bay on June 10.

On a small inland lake studded with numerous small islands, 2 miles southeast of the Fox Bay camp, an old gander with 3 very small downy young was found on June 25 swimming and feeding along the grassy shores of the lake. The nest on a small island was observed through the glass and appeared to be of grasses only. The female concealed in the tall grasss at the upper end of the lake could be heard protesting our presence. The gander and one gosling were collected. The remaining 2 goslings were placed under the care of our neighbors, the Noel family, where they were thriving when we departed July 2. On June 28, a pair was surprised while feeding in a grassy area 50 feet from the shore of a small lake in a muskeg area near the Eel Falls camp. Considerable time was consumed in an unsuccessful attempt to find the nest. On June 21 we saw a goose flying low over the sea three miles west of the Fox Bay camp.

Branta bernicla hrota (Müller). AMERICAN BRANT.—Schmitt (1904) and Dionne (1920) report this species as common during migration spring and fall. Lewis (1924) reports seeing large flocks of 3,000 to 4,000 birds at Ellis Bay on June 10, 1922.

Chen hyperborea atlantica Kennard. GREATER SNOW GOOSE.—Schmitt (1904) says that young birds in gray plumage were observed occasionally along the coast.

Anas rubripes Brewster. BLACK DUCK.—Verrill (1862a) found it "very abundant, young seen July 3." Brewster (1884) also lists this species as "common, brood of young seen." Schmitt (1904), Dionne (1920), and Brooks (1919) all list the Black Duck as very common. Lewis (1924) saw 4 at Ellis Bay on June 14, and 5 on June 15.

We saw a small flock of 6 adult birds in a small bay along the sea on June 23.

Chaulelasmus streperus (Linnaeus). GADWALL.—Verrill (1862a) reports a few individuals were seen and a young one collected.

Dafila acuta tzitzihoa (Vieillot). AMERICAN PINTAIL.—Schmitt (1904) reports this species as rare but nesting on the island. Lewis (1924) quotes from a letter from Verrill that one of his party collected 2 specimens on August 6. Lewis (1926) observed 7 at Port Menier on May 26.

Nettion carolinense (Gmelin). GREEN-WINGED TEAL.—Schmitt (1904) lists this species as rare. Dionne (1920) writes, "Rare; found only one pair with 9 young." Brooks (1919) saw a flock of 30 on August 26, 1919. Lewis (1926) records several seen at Port Menier from May 23 to June 1.

We saw one individual on June 18 at Fox Bay.

**Querquedula discors* (Linnaeus). BLUE-WINGED TEAL.—Brewster (1884) says, "fishermen report that small numbers occur at Fox Bay."

On June 20, we collected a male in small marsh near Fox Bay. On June 25 a second Blue-winged Teal was observed 3 miles south of the Fox Bay camp. On

June 28, 2 were flushed from a small muskeg lake in the close proximity of the Eel Falls camp.

So far as we know, Anticosti Island marks the northeastern limit of the range of this species.

Spatula clypeata (Linnaeus). SHOVELLER.—H. E. Graham (1939) reports shooting a Shoveller which came in with a flight of Black Ducks at the west end of the island on October 11, 1938.

Nyroca americana (Eyton). REDHEAD.—Schmitt (1904) records it as rare in migration.

Perissonetta collaris (Donovan). RING-NECKED DUCK.—Schmitt (1904) says he collected one, May 26, 1902, but considered it rare.

Fulix marila nearctica (Stejneger). GREATER SCAUP DUCK.—Lewis (1924) saw 12, presumably of this species on June 10, 4 on June 14, 1922, at Lake Gamaché, Ellis Bay, and (1926) again reports having seen several in 1926. Schmitt (1904) reports it was seen only in the spring during migration.

Fulix affinis (Eyton). LESSER SCAUP DUCK.—Schmitt (1904) says that this duck occurs in the autumn, winter, and spring and a few nest on the island.

Glaucionetta clangula americana (Bonaparte). AMERICAN GOLDEN-EYE.—Schmitt (1904) found it fairly common throughout the year. Dionne (1920) lists it as common. Brooks (1919) noted several near Ellis Bay. Verrill (1862a) caught young of this species one-third grown on July 9.

Glaucionetta islandica (Gmelin). BARROW'S GOLDEN-EYE.—Schmitt (1904) records this species as fairly common except in summer, stating that some always nest on the island.

Clangula hyemalis (Linnaeus). OLD-SQUAW.—Verrill (1862a) found this species very common, breeding abundantly. Brewster (1884) saw a few at East Point, July 7. Schmitt (1904) lists it as passing the winter on the island but not nesting. Dionne (1920) considers it a common transient. Lewis (1924) saw one at Ellis Bay, June 13, 1922.

Histrionicus histrionicus histrionicus (Linnaeus). EASTERN HARLEQUIN DUCK.—Schmitt (1904) found this species in the region of South Point.

Somateria mollissima borealis (Brehm). NORTHERN EIDER.—Schmitt (1904) records it as fairly common in winter from September to April.

Somateria mollissima dresseri Sharpe. AMERICAN EIDER.—Verrill (1862a) reports this bird "common about Anticosti." Schmitt (1904) and Dionne (1920) both report it as "very common." Lewis (1930) writes, "large batch of American Eiders observed along south shore of Labrador Peninsula in 1929." Townsend (1916) translating Beetz's notes writes, "American eiders have been in the habit of nesting on the isles of the Gulf." We saw 2 at Deep Bay on June 30.

Somateria spectabilis (Linnaeus). KING EIDER.—Verrill (1862a) saw a skin that had been collected on the island. Brewster (1884) and Schmitt (1904) both mention that the natives assured them that it was common in winter. Dionne (1920) lists it as fairly common.

Melanitta deglandi (Bonaparte). WHITE-WINGED SCOTER.—Brewster (1884) observed this bird at East Point. Schmitt (1904) lists it as, "fairly common." Lewis (1924) saw one at Ellis Bay June 13, 1922. Macoun (1909) writes, "at Anticosti it arrives about the end of May and remains about a month."

A small flock of this species was seen several times, feeding in the shallow protected bays of the sea west of Fox Bay. They were extremely shy, taking wing when we ventured nearer than 200 to 300 yards. Recorded observations were: Galleote River to Heath Point, 2 on June 17; 2 miles west of Fox Bay, 20 on June 20, 1937.

Melanitta perspicillata (Linnaeus). SURF SCOTER.—Schmitt (1904) recorded this duck as fairly common. Dionne (1920) considered it common during migration. Lewis (1924) saw one at Ellis Bay, June 13, 1922.

Oidemia americana Swainson. AMERICAN SCOTER.—Dionne (1920) observed this scoter several times. Schmitt (1904) found it rather rare.

We saw a flock of 3 on June 20 at Fox Bay.

Lophodytes cucullatus (Linnaeus). HOODED MERGANSER.—Brooks (1919) relates that several were seen in summer of 1919 by Professor W. H. Twenhofel.

Mergus merganser americanus Cassin. AMERICAN MERGANSER.—Combes (1896) lists this bird without comment. Schmitt (1904) found it rather common. Brooks (1919) writes: "a few were noted in the summer of 1919 by Professor W. H. Twenhofel of the University of Wisconsin."

We found this species quite common, though not as abundant as the Red-breasted Merganser, between June 17 and 27. It was observed along the north shore in the tide water bays and the mouths of streams. It appeared in flocks of 2 to 12 birds.

**Mergus serrator serrator* (Linnaeus). RED-BREASTED MERGANSER.—This was one of the commonest of the ducks found on the island, 78 individuals being observed in 8 days. Verrill (1862a) reported a nest with 6 eggs found July 17, and young seen July 3, and Schmitt (1904) found a nest with fresh eggs July 20. 1903. Dionne (1920) and Brooks (1919) both report this form common on the island.

This species occurred along the coast and in the river mouths where it was observed feeding in the open pools of the rivers and streams. None were seen in the numerous lakes of the muskeg areas in the vicinity of the Eel Falls camp.

On June 18 we found a nest with 12 fresh eggs on the ground, sheltered and completely hidden by low-growing, matted branches of spruce. The nest, composed of short dead spruce twigs with a small quantity of down ringing the outer edge of the cupped depression, was located on a small island in a pool at the mouth of Fox Bay. The female was collected.

Astur gentilis atricapillus (Wilson). EASTERN GOSHAWK.—Schmitt (1904) reports this bird as a rare permanent resident. Dionne (1920) found it not common. Brooks (1919) says the species is common at Ellis Bay.

Accipiter striatus velox (Wilson). SHARP-SHINNED HAWK.—Verrill (1862a) saw one at Salmon River. Schmitt (1904) and Dionne (1920) reported it common.

Buteo jamaicensis borealis (Gmelin). EASTERN RED-TAILED HAWK.—Schmitt (1904) records this species as a rather rare permanent resident.

Buteo lagopus s.johannis (Gmelin). AMERICAN ROUGH-LEGGED HAWK.—Schmitt (1904) writes that this species was common some years.

Aquila chrysaëtos canadensis (Linnaeus). GOLDEN EAGLE.—Combes (1896) reports Mr. Gibsone, lighthouse keeper at Heath Point, gave him a foot of a Golden Eagle. Schmitt (1904) lists it as a rare permanent resident bird and found a nest on Jupiter River.

Haliæetus leucocephalus washingtoniensis (Audubon). NORTHERN BALD EAGLE.—Verrill (1862a) saw one or two in July at Ellis Bay. Schmitt (1904) calls the Bald Eagle a rare permanent resident which nests in June and July. Dionne (1920) found it fairly common. Brooks (1919) saw one or two every day.

Circus cyaneus hudsonius (Linnaeus). MARSH HAWK.—Schmitt (1904) and Dionne (1920) list this hawk as rather rare.

**Pandion haliaëtus carolinensis* (Gmelin). OSPREY.—Lewis (1924) reports one nesting at Ellis Bay, June 15. Verrill (1862a), as well as Brewster (1884), report seeing a few at Ellis and Fox Bays. Dionne (1920), however, reports this species as very common.

The natives reported a small colony of Ospreys nesting in the vicinity of Ellis Bay, stating that this bird was much more numerous on the south than on the north shore of the island. A pair was observed each day, usually appearing in mid-afternoon to fish over the western portion of Fox Bay. After the capture of a fish they would fly southwest to the interior of the island, to return within 30 minutes to fish again. Undoubtedly this pair was feeding young somewhere southwest of the Fox Bay camp.

We collected a female at Fox Bay on June 22, 1937.

Falco rusticolus obsoletus Gmelin. BLACK GYRFALCON.—Schmitt (1904) reports seeing a few each summer. Dionne (1920) saw one in 1916.

Falco peregrinus anatum Bonaparte. DUCK HAWK.—Dionne (1920) saw this hawk quite frequently on Anticosti.

Falco columbarius columbarius Linnaeus. EASTERN PIGEON HAWK.—Schmitt (1904) lists it as occurring rarely in the summer. Dionne (1920), however, considered it very common. Brooks (1919) found this hawk fairly common about Ellis Bay. Lewis (1938a) saw one stoop at 2 Greater Yellow-legs along the shore at Port Menier on May 25, 1926.

Cerchneis sparveria sparveria Linnaeus. EASTERN SPARROW HAWK.—Schmitt (1904) reported this little hawk as rather rare and as occurring in summer only. Dionne (1920) saw one individual.

Bonasa umbellus togata (Linnaeus). CANADA RUFFED GROUSE.—Lewis (1926) saw a number in the vicinity of Port Menier and was informed by the natives that this bird had been recently introduced from mainland stock.

We saw none but were informed by the natives that they were fairly common.

Lagopus rupestris rupestris (Gmelin). ROCK PTARMIGAN.—Lewis (1924) writes, "Brewster has recorded 2 specimens taken on Anticosti by Mr. Gardiner, of his party." Schmitt (1904) lists them as a fairly common permanent resident bird.

The natives informed us that a very few were still seen from time to time.

Porzana carolina (Linnaeus). SORA.—Schmitt (1904) found this rail rare in summer. One specimen collected by M. Malouin was given to Schmitt. Dionne (1920) saw but one individual.

Gallinula chloropus cachinnans Bangs. FLORIDA GALLINULE.—Schmitt (1904) says of this species: "Summer. Rather rare."

Fulica americana americana Gmelin. AMERICAN COOT.—Schmitt (1904) considers the Coot a rare summer resident.

Charadrius semipalmatus Bonaparte. SEMIPALMATED PLOVER.—Dionne (1920) found this plover fairly common in autumn. Brooks (1919) saw a small flock on August 26.

Oxyechus vociferus vociferus (Linnaeus). KILLDEER.—Dionne (1920) reported a single bird seen on the beach at Anse aux Fraises.

Pluvialis dominica dominica (Müller). AMERICAN GOLDEN PLOVER.—Schmitt (1904) found it fairly common in autumn. Dionne (1920) records it as fairly common.

Squatarola squatarola squatarola (Linnaeus). BLACK-BELLIED PLOVER.—Schmitt (1904) observed them fairly common during autumn migration. Dionne (1920) also considered it fairly common. Brooks (1919) saw a number near Ellis Bay.

Arenaria interpres morinella (Linnaeus). RUDDY TURNSTONE.—Schmitt (1904) reports the Ruddy Turnstone as fairly common in September. Dionne (1920) found it common in autumn. Brooks (1919) reports having seen several.

Rubicola minor (Gmelin). AMERICAN WOODCOCK.—We have been unable to find any definite record that this species has been collected or seen on Anticosti. Brewster (1884) writes, "Mr. Gardiner thought that he flushed another [Woodcock] in a springy place at Fox Bay, Anticosti, but the foliage was so dense that he did not get a clear sight of it." The Consolidated Paper Corporation, owners of Anticosti, list Woodcock as one of the game birds to be taken in season. From this it would seem that more Woodcock occur on the island during migration than published observations disclose.

We saw but one of this species. It was observed for several minutes on June 28, feeding along the mucky border of a muskeg area before taking flight.

**Capella gallinago delicata* (Ord). WILSON'S SNIPE.—Judging from our experience and that of all other authors, this snipe is apparently fairly common on Anticosti Island, appearing along the mud flats and seashore to feed early in the morning among the kelp and debris left by an ebbing tide. It was observed to leave its feeding grounds singly and in pairs for the interior in the mid-forenoon. Along

the shores of the ponds of the muskeg areas at the Eel Falls camp it was observed feeding in small groups during the latter part of the day. This species undoubtedly breeds on the island, though no nests have been reported to date. We collected a female at Fox Bay on June 18.

Phaeopus hudsonicus (Latham). HUDSONIAN CURLEW.—Brewster (1884) saw at East Point large flocks of what he took to be this species. Schmitt (1904) observed it during autumn migration. Dionne (1920) lists it as fairly common.

**Actitis macularia* (Linnaeus). SPOTTED SANDPIPER.—This species was not as common about Fox Bay as others have evidently found it elsewhere on the island. Verrill (1862a), lists it as common, breeding; Brewster (1884) abundant. Schmitt (1904) says, "fairly common; nests on the island."

We found this species not common in the areas explored, occurring only locally along the sea coast. Extending west of Fox Bay and encircling the bay is a ridge of loose washed limestone, with an elevation of 6 feet above high tide. This ridge flattens at its top to a width of 10 to 30 feet and extends some 2 miles to meet the receding cliff at the western extremity of the bay. Behind this ridge lie fresh water bays of Fox River and salt water lagoons. Where a little spruce needle humus gathers along the ridge top, there appears a luxuriant growth of coarse tall grass. Other areas are topped with various sizes of round and flat limestone dotted with an occasional tuft of weed or grass. This is the habitat of the Spotted Sandpiper and we observed but few elsewhere. On the ridge, three-fourths of a mile west of the Fox Bay camp, stood an abandoned lobster cannery shed with several smaller storage sheds. Several of these had collapsed with timber and shingle debris scattered over the ridge top. A bird, which proved to be the female, was flushed from between two timbers of one of these collapsed sheds, its behavior indicating a nesting bird. We collected the bird and found the 4 eggs and nest, a slight depression in the shingle debris ringed with a few dry stems of grass.

It has been the general opinion that incubation of the eggs is performed entirely by the male of the species. A. C. Bent (1929) says, "in incubation as well as courtship, the male [Spotted Sandpiper] has been shown to assume duties which are usually ascribed to the female." From our findings it would appear that the female at least shares the incubation duties.

We flushed a second bird from a densely grassed area, 100 yards from the above described nest. The vegetation being dense, it was deemed advisable to retire lest in looking for the nest it be trampled upon. That afternoon, we again visited the location, the male flushed and was collected and the nest, well built of dry grass with a well defined bowl, was found concealed in a tuft of high grass.

Tringa solitaria solitaria Wilson. EASTERN SOLITARY SANDPIPER.—Schmitt (1904) found this species rather rare. Brooks (1919) saw one near Ellis Bay on August 28. Lewis (1926) saw a single individual at Port Menier, May 28.

**Totanus melanoleucus* (Gmelin). GREATER YELLOW-LEGS.—We found this species common as did Verrill (1862a), Brewster (1884), and Dionne (1920). Schmitt (1904) states, "nests on the island." Lewis (1924), however, records this bird as "not common at Ellis Bay, June 10-16, 1922."

The Greater Yellow-legs were common over the entire area worked by our group, being observed inland about the muskeg lakes as well as along the seacoast. Small flocks fed along the seashore in the morning at low tide. During the day the Yellow-legs in pairs or singly could be seen or heard traveling inland or back to the sea. On June 25, Dr. McCullagh, while working a muskeg area 2 miles southeast of the Fox River camp, flushed a pair of Greater Yellow-legs from the deer moss and grass. The pair circled closely and dived and darted at the intruder with all the indication of having a nest or young in the immediate vicinity. Considerable time was consumed in an unsuccessful attempt to find the nest or young. This species doubtless breeds along the shores of the inland muskeg lakes. We collected several specimens at Fox Bay June 18 to 24.

Calidris canutus rufus (Wilson). AMERICAN KNOT.—Schmitt (1904) lists this species as rare.

Pisobia melanotos (Vieillot). PECTORAL SANDPIPER.—Schmitt (1904) reports it common in September. Dionne (1920) found it very common.

Pisobia fuscicollis (Vieillot). WHITE-RUMPED SANDPIPER.—Verrill (1862a) found this form in large flocks on August 14. Schmitt (1904) reports it fairly common in autumn. Dionne (1920) and Brooks (1919) both record it as abundant.

**Pisobia minutilla* (Vieillot). LEAST SANDPIPER.—We did not find this species as abundant in the Fox Bay region as have others elsewhere on the island. Verrill (1862a) states that "large numbers were seen on a large marshy heath near Ellis Bay where they appeared to be nesting." Brewster (1884) says, "few were observed daily along beaches at Fox Bay." Schmitt (1902) recorded it as "very common." Brooks (1919) says, "quite common along shores of Ellis Bay." Macoun (1909) is of the opinion that it breeds in small numbers on Anticosti Island.

We collected the female of a pair flushed from a muskeg area two miles southeast of Fox Bay camp on June 25.

Ereunetes pusillus (Linnaeus). SEMIPALMATED SANDPIPER.—Schmitt (1904) reports this sandpiper as fairly common.

Crocethia alba (Pallas). SANDERLING.—Schmitt (1904) found it common during autumn migration. Dionne (1920) lists it as very common.

Steganopus tricolor Vieillot. WILSON'S PHALAROPE.—Schmitt (1904) considered this species very rare, probably accidental.

Lobipes lobatus (Linnaeus). NORTHERN PHALAROPE.—Brewster (1884) saw a flock and collected specimens between Cape Rosier (Gaspé) and Anticosti. Schmitt (1904) found it, at first appearing irregularly, then rather commonly. One specimen was killed, June 9, 1902.

Stercorarius parasiticus (Linnaeus). PARASITIC JAEGER.—Verrill (1862a) saw it frequently in the gulf. Schmitt (1904) collected three specimens but lists it as rather rare, July to September.

Stercorarius longicaudus Vieillot. LONG-TAILED JAEGER.—Schmitt (1904) was in possession of a single specimen taken about 1900 and considered the species very rare.

Larus hyperboreus hyperboreus Gunnerus. GLAUCOUS GULL.—Schmitt (1904) found this big gull wintering on the island.

Larus leucopterus Vieillot. ICELAND GULL.—Schmitt (1904) says that this species occurs occasionally in winter. Lewis (1927) identified two individuals at Ellis Bay on May 21, 1927.

**Larus marinus* Linnaeus. GREAT BLACK-BACKED GULL.—Our observations are in accord with those of other authors who record that this big gull breeds rather commonly on Anticosti Island.

Austin (1932) says, "the Great Black-backed Gull is not a colonial breeder, though throughout the lower two-thirds of Labrador breeding pairs are thickly distributed, especially in districts where there are many small islets." This was the type of breeding locality selected on Anticosti Island. On June 18, we visited near Fox Bay a small shallow lake of but 2 or 3 acres which contained 10 or 12 small grassy islands. A small colony of Great Black-backed Gulls, probably 10 pairs, was nesting on the small islands. Nests of previous years were evident immediately adjacent to the nests then occupied with downy young or eggs with well advanced embryos. Downy young were observed partly hidden in the overhanging grasses along the small islands. One nest with a pipped egg and one downy young was found on an exposed knob not over 2 feet in diameter. The nest practically covered the tiny islet. Several other lakes in the immediate vicinity, containing similar island habitats, were explored in vain for indication of former nesting. Since the adjoinng lakes, some within 100 yards, offered similar habitats it is difficult to understand why this colony insisted upon the occupancy of this particular island lake year after year.

Larus kumlieni Brewster. KUMLIEN'S GULL.—Two individuals of this form, now supposed by many to be a hybrid between *Larus leucopterus* and *Larus argentatus thayeri,* were identified by Lewis (1927) in Ellis Bay on May 21, 1927.

**Larus argentatus smithsonianus* Coues. HERRING GULL.—All previous writers agree as to the abundance of this species on Anticost as well as most other localities in the Gulf of St. Lawrence.

We found the Herring Gull abundant all along the northeast shore of the island. Between Lobster Bay and Cape Henri a slight indentation in the cliff wall forms a snug little bay guarded on the east by a 400 foot perpendicular limestone cliff, at the foot of which were enormous triangular shaped fragments of the cliff deposited during an earthquake disturbance of some 7 years before. These fragments, while reaching elevations of 20 feet or more, could be scaled without the use of ladder equipment. There were small, comparatively flat areas along their sides and on their peaks which afforded nesting sites for a colony of Herring Gulls. The cavities and seams were occupied by a colony of Black Guillemots. Elsewhere along the high cliffs we had observed many downy young Herring Gulls, some in nests, others traversing the narrow limestone ledges, indicating early nesting of this species. In view of its known habit of early breeding, we were agreeably surprised to find 2 nests of 3 eggs, 5 nests of 2 eggs, and 11 nests containing but one egg, all eggs unincubated. Our French guides seeing our perplexities explained that coastal fisherman, desiring fresh eggs, oftimes land in small boats and augment their ship's fare with the fresh eggs from this colony of Herring Gulls and Guillemots. Doubtless these eggs were of a second laying as a result of earlier depredations. The nesting of this Anticosti colony was, as P. A. Taverner has expressed it, "on the ground or rocky ledges or flat tops of isolated rocks in nest of seaweed or vegetable matter."

Larus delawarensis Ord. RING-BILLED GULL.—Schmitt (1904) lists it as rather rare; specimen collected September 18, 1901. Lewis (1926) reports a number observed at Port Menier from May 20 to May 30.

Larus philadelphia (Ord). BONAPARTE'S GULL.—Verrill (1862a) found this little gull abundant at the Gut of Canso, August 21, but at no other time. Schmitt (1904) reports it as rather common in summer. Brooks (1919) saw a few on August 22 and 23 on the Gulf.

Pagophila alba (Gunnerus). IVORY GULL.—Schmitt (1904) reports it very rare. He collected a specimen October, 1902.

**Rissa tridactyla tridactyla* (Linnaeus). ATLANTIC KITTIWAKE.—As have apparently all other authors, we found this species the most abundant sea bird on the island, ranging along the entire north shore. Because of their great abundance, it was difficult to estimate the number of Kittiwakes observed during the day. On June 27, in the vicinity of Birds Bay, we estimated a total of 10,000 individuals, with thousands nesting along the cliffs. Kittiwakes in a continuous line were flying east along the cliff approximately 100 feet above the sea, while others in a continuous line returned flying west just above water line, giving the appearance of two well directed lines of traffic along a city street.

The ledges below the level of the Gannet nests at Birds Bay were occupied chiefly by the Kittiwakes. The ravages of wind and weather had worn away the lower four-fifths of these cliffs so as to produce an overhang of 10 to 20 feet. The nests of the Kittiwake were placed under this overhang and extended from 50 to 60 feet from the top to within 25 feet of the beach. Most of the nests were on small shelves of thin limestone.

The nests were neat structures, well built, chiefly of moderately fine grasses and moss with an occasional bit of seaweed. Most of the nests were of a rounded, low conical shape, the edges hanging over the ledge. Two or three eggs occupied the cup-shaped depressions which were 2 to 3 inches in depth.

**Sterna hirundo hirundo* Linnaeus. COMMON TERN.—We found the Common Tern all along the north shore and concur with Schmitt (1904), Dionne (1920),

and Brooks (1919), all of whom report this species as common. Lewis (1924) reports, "Terms, either Common or Arctic," occurring at Ellis Bay.

We found no indication of the breeding of this species, but Mr. Graham, Island Manager, informed us that the tern (probably the Common Tern) nested about the first of June on the stone reefs in Ellis Bay.

**Alca torda* Linnaeus. RAZOR-BILLED AUK.—There is some variance of opinion among earlier writers as to the abundance of this species. Verrill (1862a) reports, "common; breeds on the east and north shores." Brewster (1884) writes, "numerous at Wreck Bay." In contrast to these reports, Schmitt (1904) says, "found only in autumn, rather rare." Brooks (1919) "saw only single specimen near North Cape, Sept. 13, 1919." Lewis (1924) records "one seen near West Point, June 16, 1922." Macoun (1909) writes, "breeds, but not in large numbers on the Great Bird rock, Bryon island, Entry island and Magdalen islands, Gulf of St. Lawrence."

We found the Razor-billed Auk fairly common along the rocky cliffs of the north shore, nesting in the crevices and fissures of cliffs of 20 to 30 feet of elevation. Its numbers, apparently much depleted in the period following Brewster's visit, appear to have been somewhat restored.

We collected eggs from six nests (3 and 6 miles east of Fox Bay) on June 20 and 21. Some eggs were fresh but others were about to hatch.

**Uria aalge aalge* (Pontoppidan). ATLANTIC MURRE.—Although Macoun (1909) records only two breeding locations for this species in the Gulf of St. Lawrence, not including Anticosti, most ornithologists who have worked on this island have recorded it as breeding.

We found this species rather abundant along the north shore, concentrating at Birds Bay, where the 300-foot cliffs afforded an ideal nesting area. On June 20 we visited this area and estimated 100 pairs of Murres nesting with the Gannets in the immediate vicinity of Birds Bay. On June 26, in the vicinity of Salmon River where cliffs attain a height of 370 feet, we estimated 75 nesting Murres.

At Birds Bay on the wider ledges of limestone, 30 to 50 feet from the top, sat groups of Murres in rows, chiefly with their backs to the sea, standing upright, bowing to each other, and solemnly pronouncing their names in low, hoarse voices. These nesting ledges were 4 to 12 feet wide, fairly level, with a slight slope to the sea. These ledges were covered with a wet slippery deposit of loam. The eggs lay scattered, some 3 feet from the cliff's edge, others but a few inches, their peculiar pyriform shape being their only protection against rolling off the edge. Eggs collected from six nests at Birds Bay on June 27 ranged from fresh eggs to those about to hatch.

Alle alle (Linnaeus). DOVEKIE.—Schmitt (1904) found the Dovekie common from September to May. Dionne (1920) says it is common in autumn and winter.

**Cepphus grylle grylle* (Linnaeus). BLACK GUILLEMOT.—All former writers agree as to the abundance of the species on Anticosti Island. We found the Black Guillemot to be very abundant along the north coast. The natives call this bird "pigeon de mer," asserting that the flesh of the Black Guillemot, like that of the Puffin and Razor-billed Auk, is very palatable in the fall of the year and is sought after for food. The Black Guillemots are quite tame, permitting a closer approach than others of the sea birds. They nest in the seams and cavities found in the limestone cliffs, laying their one or two eggs 4 to 6 feet in from the entrance of the cavity. The eggs are deposited directly on the small crumbling fragments of limestone. The incubating birds often remain on the nest until lifted from it. We collected eggs 3 miles west of Fox Bay and 3 miles west of Salmon River on June 21 and 26 respectively.

**Fratercula arctica arctica* (Linnaeus). ATLANTIC PUFFIN.—We found this, as have other authors, an abundant bird in the cliff areas of the north shore. These odd little "old men of the sea," with their deep, thin bills of red, orange, and yellow, would sit on the sea in small flocks of four to a dozen, permitting our boat to pass within 10 yards without flying.

While it is common knowledge that the Puffin prefers an excavated burrow to a natural cavity as a nesting location, the Puffins along the north shore of Anticosti were found nesting in the natural crevices and cavities of the cliffs. This choice of nesting site may be due to the fact that little soil covers the rocky formation of the island, making burrowing difficult or impossible.

Their single eggs were deposited on the cold, wet, muddy stone floor of the small cave-like recesses in the cliffs, usually about 4 feet, though several were 6 to 8 feet from the entrance. In some instances an infertile egg of a previous year was still almost intact near this year's fresh egg.

Zenaidura macroura carolinensis (Linnaeus). MOURNING DOVE.—Schmitt (1904) reports this species found during October and November but only rarely. He submitted specimens to Dionne for identification.

Ectopistes canadensis (Linnaeus). PASSENGER PIGEON.—Verrill (1862a) reports having seen one at Heath Point. Schmitt (1904) states that a few individuals were seen after Verrill's time but none in the ten years before 1904.

Nyctea nyctea (Linnaeus). SNOWY OWL.—Combes (1896) reports that M. Malouin, keeper of West Point light, killed one. Schmitt (1904) records them as appearing irregularly in winter.

Surnia ulula caparoch (Müller). AMERICAN HAWK OWL.—Schmitt (1904) found this owl common except in summer. Dionne (1920) reported them as common in 1913.

Strix varia subsp. BARRED OWL.—Schmitt (1904) reports this species as rather rare.

Asio flammeus flammeus (Pontoppidan). SHORT-EARED OWL.—Schmitt (1904) lists this owl as fairly common.

Cryptoglaux funerea richardsoni (Bonaparte). RICHARDSON'S OWL.—Schmitt (1904) found them a rather rare permanent resident.

Cryptoglaux acadica acadica (Gmelin). SAW-WHET OWL.—Schmitt (1904) considered this species a rare permanent resident.

Chordeiles minor minor (Forster). EASTERN NIGHTHAWK.—Schmitt (1904) found them fairly common in summer. Brooks (1919) saw one at Ellis Bay. Dionne (1920) lists it as uncommon.

Chaetura pelagica (Linnaeus). CHIMNEY SWIFT.—Schmitt (1904) considered it rather rare and found in summer only.

Archilochus colubris (Linnaeus). RUBY-THROATED HUMMINGBIRD.—Schmitt (1904) records seeing but 2 of this species.

Megaceryle alcyon alcyon (Linnaeus). EASTERN BELTED KINGFISHER.—Verrill (1862a) writes, "seen, but not frequently." Combes (1896) recorded it on the Becscie River. Schmitt (1904) found it fairly common and says, "nests on the island." Dionne (1920) and Brooks (1919) both report it common. Lewis (1924) saw one at Ellis Bay, June 14.

This species was of rather rare occurrence, being seen but twice in widely separated areas. While exploring some 2 or 3 miles up-stream along the Fox River, on June 24, we saw a Kingfisher plunge from a dead spruce into a small pool of the river and emerge with what appeared to be a small trout. McCullagh observed 2 on June 30 in a small pool on Deep Bay River.

**Colaptes auratus borealis* Ridgway. BOREAL FLICKER.—Our experience with this species on Anticosti Island confirms the opinions of other writers that the Flicker is uncommon there. It was certainly not common around Fox Bay, although 3 individuals were seen on June 23, one mile south of our camp. A female collected June 29 at the Eel Falls Camp proved to be *Colaptes auratus borealis*, thus extending the range of that subspecies, as delineated by Ridgway (1914) and Oberholser (1938), southward from Labrador.

Phloeotomus pileatus abieticola (Bangs). NORTHERN PILEATED WOODPECKER.—We are unable to find any previous record of this species from Anticosti. However,

we saw one in a heavily wooded area just west of the Fox Bay camp on June 22, 1937.

**Sphyrapicus varius atrothorax* (Lesson). NORTHERN YELLOW-BELLIED SAPSUCKER.—Although Lewis (1926) found this to be the most common species of woodpecker on Anticosti Island in late May, 1926, we recorded but one. We collected a male June 20 on a spruce ridge one mile west of the Eel Falls camp in an area where several other forms of the family *Picidae* were collected.

Oberholser (1938) has shown that Yellow-bellied Sapsuckers from the northern United States and Canada are larger than breeding birds of the middle eastern United States and deserve recognition as a distinct subspecies for which Lesson's name *atrothorax* is available.

**Dryobates villosus septentrionalis* (Nuttall). NORTHERN HAIRY WOODPECKER.—The Hairy Woodpecker was observed in small numbers throughout the wooded areas explored, occurring as frequently along the timbered coast line as on the wooded ridges. Judging from our observations and the writings of others, particularly Schmitt (1904) and Dionne (1920), this species is fairly evenly distributed throughout the island.

It would seem from the writings of Macoun (1909), Cory (1878) and Austin (1932), that the Hairy Woodpecker is considered uncommon from the Magdalens northward except in Newfoundland, but our records show 11 birds and 2 nests observed during our stay on Anticosti. On June 24, one mile west of the Fox Bay camp, a Hairy Woodpecker was observed entering a cavity with food; while on June 29 another was observed to leave a cavity from which the buzz of the young could be heard. We collected 3 males and one female at Fox Bay June 19 to 25 and a female at Eel Falls on June 29.

Anticosti Island apparently marks the southeastern limit of the range of the big northern race, *septentrionalis*, since the A.O.U. Check List (1931) includes the Magdalen Islands in the range of *villosus* and Newfoundland is occupied by *terraenovae*.

**Dryobates pubescens microleucus* Oberholser. NEWFOUNDLAND DOWNY WOODPECKER.—A common species as found by Verrill (1862a). Brewster (1884) found "a pair with nest of young ready to fly, Fox Bay, July 11." Schmitt (1904) and Dionne (1920) both report this woodpecker "fairly common" while Lewis (1924) reported it as the "most common woodpecker" on Anticosti in mid June 1922.

We found this species most common along the wooded ridges in the vicinity of the Eel Falls camp, diminishing in numbers toward the coast line where only an occasional one was observed. Several nests with young ready to leave were found and other adult birds were observed carrying food. We collected 8 adults and 2 nestlings, principally at Eel Falls.

The discovery that the Downy Woodpecker of Anticosti Island belongs to the dark colored race, *microleucus*, formerly supposed to be confined to Newfoundland, was one of the more interesting results of our trip.

**Picoides arcticus* (Swainson). ARCTIC THREE-TOED WOODPECKER.—Schmitt (1904) lists this species as "fairly common." Dionne (1920), "apparently rare." Brooks (1919) collected a pair. Lewis (1924) "saw one near Ellis Bay."

We saw but one pair of this species. On a wooded ridge one mile east of the Eel Falls camp on June 29 we collected a male which was carrying a spider in his bill. We finally located the nest in the cavity 15 feet from the ground in a live spruce. From concealment we watched the female enter the cavity three times with food in spite of the loss of the male.

**Picoides tridactylus bacatus* Bangs. AMERICAN THREE-TOED WOODPECKER.—Dionne (1920) reports seeing "an old female and a brood of young at Ellis Bay." Brewster (1884) reports an adult female and young seen at Ellis Bay on July 24. Schmitt (1904) lists them as "fairly common," and Brooks (1919) collected a pair.

We found more of these woodpeckers than of *Picoides arcticus*, though both were uncommon. It was observed only in the vicinity of Eel Falls where on June

28 a nest of 4 well-feathered young were found in a cavity of a spruce. We collected three adults there.

Tyrannus tyrannus tyrannus (Linnaeus). EASTERN KINGBIRD.—Schmitt (1904) lists 2 taken May 7, 1903 at English Bay. Lewis (1925, 1926) saw one at Ellis Bay on August 1, 1924 and one near Port Menier on May 30, 1926.

**Empidonax flaviventris* (Baird and Baird). YELLOW-BELLIED FLYCATCHER.—Notwithstanding the fact that Chamberlain (1887), Brewster (1884), and Lewis (1924) all reported this species common, we noted it only on June 28 when we collected 3 and saw another in the wooded area a mile west of the Eel Falls camp.

Empidonax traillii traillii (Audubon). ALDER FLYCATCHER.—Schmitt (1904) considered this flycatcher fairly common in summer. Lewis (1924) found it fairly common at Ellis Bay in June, 1922.

Empidonax minimus (Baird and Baird). LEAST FLYCATCHER.—Lewis (1924) saw a male on June 15, 1922, at Ellis Bay.

Nuttallornis borealis cooperi (Nuttall). EASTERN OLIVE-SIDED FLYCATCHER.—Schmitt (1904) lists it as rare. Brooks (1919) saw one September 3, 1919.

Otocoris alpestris alpestris (Linnaeus). NORTHERN HORNED LARK.—Schmitt (1904) writes that this species occurs in flocks in May, September, and October. Dionne (1920) found it fairly common during migration. Lewis (1924) saw a caged bird that had been taken on the island.

**Iridoprocne bicolor* (Vieillot). TREE SWALLOW.—Most authorities list this species as common and we found it one of the most abundant birds on the island. The inhabitants of the island boasted a telephone system consisting of a single steel wire, attached to any available support, encircling the island along the shore line. Early each morning the Tree Swallows would assemble by the hundreds on this single wire, like clothes-pins on a wash line. We collected several at Fox Bay on June 18.

Riparia riparia maximiliani (Stejneger). AMERICAN BANK SWALLOW.—Verrill (1862a) lists this species as common, but since there are no other records it seems likely that the species is now either very localized or greatly diminished in numbers on the island.

Hirundo rustica erythrogastra Boddaert. BARN SWALLOW.—Schmitt (1904) considered this swallow a summer resident. Dionne (1920) observed it rarely. Lewis (1938b) saw 2 on July 16 at Port Menier.

Petrochelidon albifrons albifrons (Rafinesque). NORTHERN CLIFF SWALLOW.—Verrill (1862a) found a large colony breeding on the cliffs at the entrance to Ellis Bay on July 15. Since there are no later records, that colony evidently no longer exists.

**Perisoreus canadensis barbouri* W. S. Brooks. ANTICOSTI JAY; CANADA JAY.—W. S. Brooks (1920) originally described this insular subspecies as *Perisoreus barbouri*. Most writers agree as to the abundance of this resident species. Lewis (1924) reports, "several observed at Ellis Bay, June 10-16, 1922." Schmitt (1904), "common throughout the year." Dionne (1920), "very common."

It was reported to us by the native guides as very abundant, occurring in rather large flocks during the winter months. The native trappers tell of leaving the door of their camps open during the winter months while they obtain water and upon returning to find a half dozen Canada Jays within the cabin feeding on the crumbs and other supplies. Contrary to the usual antagonistic feeling of Canadian trappers and woodsmen in general, the native Anticosti Islanders have a friendly attitude toward the bird. It seems that during the cold winter months when supplies are low on the mainland the "poachers" visit the island to obtain deer and trap mammals. The Canada Jays' characteristic habit of being a camp follower has often led the island game protectors to these "poacher" camps. We observed only 2 of these birds in the vicinity of Fox Bay camp and collected 5 and saw two others at the Eel Falls camp. Two of those collected were juveniles.

The native state that "la pie" disappears during the summer months. Lewis (1930) confirms this with the assertion that in most years not many Canada Jays are observed near the south coast of the Labrador Peninsula in spring and summer, although in August and September, 1929, he saw many there.

We believe that the fact that this abundant bird is not observed more during the summer months is probably due to its early spring nesting and the summer nesting of the great majority of the other birds. Young Canada Jays are apparently out of the nest in May, fully matured and flying with the adults by June, and they are driven into the interior of the island by the species nesting and defending their territories in the coastal area during the summer months. Both of the Canada Jays seen at Fox Bay camp were being pursued by angry nesting Robins.

Cyanocitta cristata bromia Oberholser. NORTHERN BLUE JAY.—Combes (1896) recorded this species. Schmitt (1904) found it common in some years from May to October.

Corvus corax principalis Ridgway. NORTHERN RAVEN.—Brewster (1884) found the Raven rather evenly distributed but not abundant along the Gulf of St. Lawrence. Schmitt (1904) records it as common throughout the year on Anticosti Island. Combes (1896) records it without comment.

This species was seen by our party on 3 different occasions (June 20, 21, and 28), flying over the spruce forests.

**Corvus brachyrhynchos brachyrhynchos* Brehm. EASTERN CROW.—This is a fairly common species on the island, but seemingly not as abundant as Verrill (1862a), Brewster (1884), and others reported it during their visits to the island. Cory (1878) lists this form as "very abundant" on the Magdalen Islands and notes that it is "quite tame in comparison with their usual shyness."

Crows were noted by us each day, usually a single bird or pair in flight. A few fed in the kelp and debris along the shore at ebb tide and appeared as shy as elsewhere. On June 24, 3 adult birds and 2 families of young were observed. We collected a female at Fox Bay on June 19.

***Penthestes atricapillus aldrichi* subsp. nov. ANTICOSTI BLACK-CAPPED CHICKADEE.

Sub-specific characters.—Similar to *Penthestes atricapillus atricapillus*, but decidedly larger, particularly the tail; the white wing edgings somewhat more conspicuous; upper surface averaging rather darker. Similar to *Penthestes atricapillus septentrionalis*, but upper parts darker and white wing edgings narrower.

Measurements: Adult male (2 specimens): wing, 67-67.5 (average 67.25) mm.; tail, 63-64.5 (63.75); exposed culmen, 9 (9); tarsus, 17.5 (17.5). Adult female (3 specimens): wing, 65-67 mm.; tail, 61.5-64 (62.83); exposed culmen, 9.5-10 (9.83); tarsus, 16.5-17 (16.83).

Type.—Adult male No. 38068, Cleveland Museum of Natural History; Eel Falls (altitude 250 feet), Fox Bay, Anticosti Island; June 29, 1937, Frank W. Braund and E. Perry McCullagh.

Range.—As far as we are aware, confined to Anticosti Island.

Remarks.—This new race of Black-capped Chickadee is geographically most closely associated with *P. a. anamesus* Todd (1938) which is said to extend south to the north shore of the Gulf of St. Lawrence. *P. a. aldrichi* is apparently an insular form separated by the waters of the Gulf of St. Lawrence from one subspecies to the north, and another (*atricapillus*) on the Gaspé Peninsula to the south.

This chickadee, while fairly common in the wooded areas, was less numerous than the Acadian Chickadee by a ratio of 1 to 2. Several families of young were observed in the vicinity of Eel Falls camp. On June 29 Braund flushed a chickadee of this species from a cavity of a spruce stump. Upon investigation, a newly

constructed nest without eggs was found, composed entirely of white hair of the white-tailed deer.

Specimens collected: 2♂, 3♀ Fox Bay and Eel Falls, June 22 to 29.

**Penthestes hudsonicus littoralis* (Bryant). ACADIAN CHICKADEE.—We found this bird much more common than *Penthestes atricapillus*, occurring in restless groups in the wooded and semi-wooded areas. Several families of young were noticed with adult birds. The song of this chickadee is similar to that of *Penthestes atricapillus*, though a little shorter and of higher pitch. We collected 6 males and 7 females at Fox Bay June 19 to 30.

**Sitta canadensis canadensis* Linnaeus. RED-BREASTED NUTHATCH.—Reported common by Verrill, Dionne, and Brooks, while Lewis (1924) reports, "Two observed at Ellis Bay on June 14 and again on June 15, 1922."

But 6 Red-breasted Nuthatches were observed by our group during the entire time spent on the island. They were noted both at the Fox Bay and Eel Falls camps.

Certhia familiaris anticostiensis subsp. nov. ANTICOSTI BROWN CREEPER.

Sub-specific characters.—Similar to *Certhia familiaris americana*, but adult above decidedly more grayish (less ochraceous), and averaging more whitish below; juvenile, much more grayish above than is the juvenile of *Certhia familiaris americana*, and also much more whitish below (less buffy or grayish). Similar to *Certhia familaris montana*, but smaller, especially the bill and wing; also averaging more whitish below, especially in juvenile plumage.

Measurements.—Adule male (1 specimen): Wing, 63.5; tail, 55; exposed culmen 14; tarsus, 15. Adult female (1 specimen): wing, 64; tail, 58; exposed culmen, 14; tarsus 14.5.

Type.—Adult female No. 38069, Cleveland Museum of Natural History, Eel Falls (altitude 250 feet), Fox Bay, Anticosti Island, June 28, 1937; Frank W. Braund and E. Perry McCullagh.

Range.—To the best of our knowledge, confined to Anticosti Island. Lewis (1926) reported this bird on Anticosti May 26, 1926 1¼ miles south of Port Menier.

We found the Brown Creeper uncommon and localized in places containing dead timber with decaying stumps. On June 28, while working an area one mile west of the Eel Falls camp, we observed 5 individuals about dead spruce stumps. The next day Moulthrop found 7 in a similar place, along a ridge 1½ miles east of Eel Falls. The only other Brown Creeper noted was a single bird in a fallen tree area along Deep Bay river.

Specimens collected: 1 ♂, 1 ♀, 1 juv. ♀, Eel Falls, June 28.

**Nannus troglodytes hiemalis* (Vieillot) EASTERN WINTER WREN.—Although Lewis (1924) considered this wren "fairly common" at Ellis Bay in June, 1922, we found it rather rare. It was observed only in the vicinity of the Eel Falls camp. There we collected a male and saw another individual along the spruce ridges and heard a third singing in a densely foliaged spruce.

Mimus polyglottos polyglottos (Linnaeus). EASTERN MOCKINGBIRD.—Schmitt (1904) collected a single specimen at English Bay on August 8, 1902.

**Turdus migratorius migratorius* Linnaeus. EASTERN ROBIN.—All naturalists who have visited Anticosti Island agree about the abundance of this species. We found it extremely abundant all along the sea coast, diminishing in numbers inland to the first ridge where, at Eel Falls, none were seen or heard. We collected one adult female at Fox Bay June 19. While Robins usually are somewhat pugnacious, those on Anticosti seem especially resentful of having their territory invaded. In exploring along the sea coast one's progress was continually dogged by scolding. protesting Robins. Nests were observed at low elevations on dense horizontal

limbs of the spruce. A set of 4 eggs collected June 19 were about half incubated but a set of 3 taken on June 24 proved to be fresh.

Hylocichla guttata faxoni Bangs and Penard. EASTERN HERMIT THRUSH.—Verrill (1862a) and Dionne (1920) list this species as common. Brewster (1884) called it "abundant." Lewis (1924) saw 2 at Ellis Bay.

**Hylocichla ustulata almae* Oberholser. ALMA'S THRUSH.—One of the most interesting discoveries arising from the study of our collection was that the Olive-back Thrush of Anticosti Island belongs to the Rocky Mountain race. Here is another case like that of *Hylocichla fuscescens* and *Melospiza georgiana*, where the supposedly western subspecies has been found to occur also on the Atlantic Coast to the north of the eastern race. It will be interesting to see whether examination of specimens of *Hylocichla ustulata* from northern Ontario and Quebec will show that *H. u. almae* has an unbroken range across northern North America, from the Rocky Mountains to the Gulf of St. Lawrence.

This thrush appeared to be rather common inland in the more densely wooded areas. The extreme shyness of the birds made it almost impossible to approach near enough to make positive identification by sight. At the Eel Falls camp, on June 28, 20 singing males were heard during the early morning and late afternoon hours. We collected a female near Fox Bay on June 25 and a male at Eel Falls on June 29. A set of 3 eggs taken near Fox Bay on June 25 proved to be slightly incubated.

Hylocichla fuscescens subsp. VEERY.—Schmitt (1904) reports this species fairly common in summer. Brewster (1884) saw a pair at Ellis Bay on June 24.

Sialia sialis sialis (Linnaeus). EASTERN BLUEBIRD.—Schmitt (1904) found it rather rare.

**Regulus satrapa satrapa* (Lichtenstein) EASTERN GOLDEN-CROWNED KINGLET.—Schmitt (1904) reports this kinglet as rather rare. We collected a male at Eel Falls on June 29 as it was singing in the upper branches of a spruce at the edge of a muskeg.

**Corthylio calendula calendula* (Linnaeus). EASTERN RUBY-CROWNED KINGLET.—There seems to be a variance of opinion in regard to the abundance of this species. Schmitt (1904) records it as rare, Lewis (1924) writes, "not common at Ellis Bay, June 1922," while Dionne (1920) reports it as common. Brewster (1884) saw a female at Fox Bay July 11.

We found this kinglet rather common in the vicinity of the Fox Bay camp where on June 23, seventeen were reported as seen or heard singing. A few were noted at the Eel Falls camp along the wooded ridges. On the whole, they seemed to prefer the thinly wooded area to the larger and denser growths. We collected two males at Fox Bay (June 18 and 25).

Anthus spinoletta rubescens (Tunstall). AMERICAN PIPIT.—Schmitt (1904) found them fairly common in summer, while Dionne (1920) found them common especially in autumn. Brooks (1919) saw 2 flocks in September.

Bombycilla cedrorum Vieillot. CEDAR WAXWING.—Schmitt (1904) lists it as a rather rare summer visitor.

Lanius exubitor borealis Vieillot. NORTHERN SHRIKE.—Schmitt (1904) reports a few individuals seen in late April but more in autumn. Dionne (1920) lists it as common.

Vireosylva olivacea (Linnaeus). RED-EYED VIREO.—Verrill (1862a) seems to be the only naturalist to date to list this species for Anticosti Island. Although he considered it common, we saw but 2, evidently a pair, at Fox Bay on June 18.

Mniotilta varia (Linnaeus). BLACK AND WHITE WARBLER.—Brewster (1884) heard a male singing at Fox Bay on July 9, and collected one July 11. Dionne (1920) found it rather rare. Brooks (1919) saw several in September. Lewis (1924) found it rather common at Ellis Bay in June, 1922.

**Vermivora peregrina* (Wilson). TENNESSEE WARBLER.—Macoun (1909) quotes Brewster as writing, "The only specimen noticed was shot at Fox Bay, Anticosti, July 11." Lewis (1924) saw 2 individuals at Ellis Bay 1922.

We collected 5 males at Fox Bay June 18 to 27. This warbler was not as common as the number of specimens collected might indicate, being probably the least numerous of the warblers observed on the island. They preferred the sparse spruce woodlands of the soft mucky valleys, or the areas along the fast running brooks and streams.

Vermivora ruficapilla ruficapilla (Wilson). NASHVILLE WARBLER.—Lewis (1924 saw 2 individuals of this species at Ellis Bay June 13, 1922.

Compsothlypis americana pusilla (Wilson). NORTHERN PARULA WARBLER.—Brewster (1884) saw a single male at Fox Bay, July 11.

**Dendroica aestiva amnicola* Batchelder. NEWFOUNDLAND YELLOW WARBLER.—Yellow Warblers of Anticosti Island proved to belong to the same race as Newfoundland birds instead of *D. ae. aestiva,* the race common to most other sections of eastern North America.

Verrill (1862a) reports seeing a few; Lewis (1924) lists them as fairly common at Ellis Bay June, 1922. Brewster (1884) writes, "One of the most abundant of its family at Fox Bay."

We found Yellow Warblers uncommon. On June 23, while walking along the ridge, one mile west of the Fox Bay camp, and within 50 yards of a calm sea, we observed 5 of these birds in a hundred yard area. A diligent but unsuccessful search was made through the sapling spruce for possible nests. The following day, in same locality, 2 Yellow Warblers were observed, but no other individuals were encountered during our visit on the island. We collected 2 males and one female.

**Dendroica magnolia* (Wilson). MAGNOLIA WARBLER.—Brewster (1884) lists this species as "More abundant than any other species of its family at Fox and Ellis Bays." Verrill (1862a) collected a specimen at Ellis Bay. Dionne (1920) and Lewis (1924) found it common.

This was a common species in the cut-over areas and sapling growths along the coast. Magnolia Warblers were observed at the Fox Bay camp at Deep Bay and Salmon River locations, but none in the interior or in the vicinity of the Eel Falls camp. We collected 5 males at Fox Bay, June 19 to 26.

Dendroica caerulescens caerulescens (Gmelin), BLACK-THROATED BLUE WARBLER.—Although this species is apparently unrecorded by former students of Anticosti birds, on two occasions (June 18 and 22) we heard males singing in the dense spruce boughs. Each time a patient wait of about half an hour finally resulted in a view of the songster.

**Dendroica coronata coronata* (Linnaeus). MYRTLE WARBLER.—This species was reported by past writers as common on Anticosti, with which opinion we are in accord. The general habitat of the Myrtle was much more diversified than that of the Magnolia Warbler. It appeared commonly in the second-growth spruce groves along the coast, and equally in the wooded spruce forests, inland. During a half day's exploration of the upper waters of Fox River, 7 singing males were seen or heard. We collected 4 males and 4 females on Anticosti.

A nest with 3 fresh eggs found in this locality June 18 was composed of small spruce twig ends interwoven with medium sized dry grasses, lined with the white hair from the tail of the Virginia deer and a half dozen small feathers. The nest straddled a crotch of a densely foliaged sapling spruce limb, 3 feet from the ground, and was so well concealed that a stray protruding straw provided the only clue to its location.

**Dendroica virens virens* (Gmelin). BLACK-THROATED GREEN WARBLER.—Brewster (1884) saw this species at Fox and Ellis Bays. Dionne (1920) and Brooks (1919) also observed it on Anticosti. Lewis (1924) found it common at Ellis Bay in June, 1922.

We found this warbler very abundant throughout the areas explored, with a seeming concentration along the heavily wooded ridges in the vicinity of the Eel Falls camp, where on June 29, 36 individuals were seen or heard singing. The territory of the singing males averaged about 200 yards in diameter. Although the birds were concealed in the dense growth of spruce, their incessant insect-like song betrayed their presence as we walked for miles along the ridge. We collected 4 males at Fox Bay and 3 at Eel Falls.

**Dendroica breviunguis* (Spix). BLACK-POLL WARBLER.—Brewster (1884) records Black-poll Warblers as "Decidedly the most numerous of the warblers on the Magdalen islands, and fairly common at Anticosti as well." Lewis (1924) says "They are fairly common at Ellis Bay June, 1922." Dionne (1920), however, refers to this warbler as "rather rare."

In our experience this species proved to be one of the most abundant of the warbler group, outnumbered only by the American Redstart. While the Black-poll was observed throughout the area covered, its concentration appeared to be along the coast, where on June 23, 22 individuals were observed in the vicinity of the Fox River camp. We collected 4 males and 8 females there.

Seiurus aurocapillus (Linnaeus). OVEN-BIRD.—Verrill (1862a) obtained a specimen at Ellis Bay July 15. Brewster (1884) observed a single pair at Ellis Bay July 24. Schmitt (1904) and Dionne (1920) both list it as rather rare. Lewis (1924) saw two on June 13, 1922 and one on June 15.

We saw but one pair, and that on June 29, in a damp and boggy area bordering a muskeg. The male was heard and seen singing, and the female was shortly afterwards flushed from a dense growth of vegetation.

Seiurus noveboracensis noveboracensis (Gmelin) NORTHERN WATER-THRUSH.—Brooks (1919) saw several near Ellis Bay. Lewis (1924) saw one on June 13, and three on June 14, 1922. Lewis (1926) considered this species fairly common after May 28.

***Geothlypis trichas pelagitis** subsp. nov. ANTICOSTI YELLOW-THROAT.

Sub-specific characters.—Similar to *Geothlypis trichas brachidactyla* but smaller, the upper surface duller and more grayish (less greenish or yellowish). Crissum duller.

Measurements.—Adult male (3 specimens): wing 52.5-58 (average 54.83) mm.; tail 47-52.5 (49.75); exposed culmen, 10.5-11 (10.83); tarsus, 19.5-21 (20.5).

Type.—Adult male, No. 38070, Cleveland Museum of Natural History; Eel Falls, altitude 250 feet, Fox Bay, Anticosti Island; June 28, 1937; Frank W. Braund and E. Perry McCullagh.

Geographic Distribution.—Apparently confined to Anticosti Island. Lewis (1924), Verrill (1862a), and Schmitt (1904) found Yellow-throats to be common on Anticosti Island, while Dionne (1920) found them rare, and Brooks (1919) saw only three.

We found this Yellow-throat common along the marshy borders of the muskeg areas in the vicinity of the Eel Falls camp, where on June 23, 17 were seen.

Specimens collected: 3 males, Fox Bay and Eel Falls, June 23 to 28.

Wilsonia pusilla pusilla (Wilson). WILSON'S WARBLER.—Schmitt (1904) found this species rather rare. Brooks (1919) saw them on August 24 at Ellis Bay. Brewster (1884) saw adults feeding young at Ellis Bay. Lewis (1924) found them common at Ellis Bay.

Wilsonia canadensis (Linnaeus). CANADA WARBLER.—Dionne (1920) saw but two. Lewis (1924) writes, "In a letter dated January 11, 1924, Mr. Willie La Brie has kindly furnished me with the following details concerning the observations, made by him, upon which Dionne's record, quoted above, was based: 'I found a pair of these birds, male and female, during the summer of 1917. I saw this pair several times, and I believe that they nested there, for I saw the female in June carrying

fibrous material in her beak. I saw the same pair again in July, at the same place, apparently much distressed at my presence, causing me to believe that their nest must be near. I saw only this pair.'"

**Setophaga ruticilla ruticilla* (Linnaeus). AMERICAN REDSTART.—Brewster (1884) found this bird not uncommon at Ellis and Fox Bays. Verrill (1862a) and Dionne (1920) reports them as common. Lewis (1924) found them "Very common at Ellis Bay in June, 1922."

We consider this warbler the most abundant of all the land birds occurring on the north shore of Anticosti. There appeared to be no variation in abundance in any of the areas visited except the muskegs. One forenoon Braund explored a group of small lakes situated 3 miles west and along the coast from the Fox River camp. The route to this location was along the wind-swept and storm-blown cliff summits where great areas of up-rooted, twisted spruces lay dead and bleached in windrows. The only bird observed in the 3 miles of travel was the Redstart. Our records show 42 Redstarts observed on June 24. We collected 8 males and 2 females at Fox Bay June 18 to 24.

On June 22, Braund heard what appeared to be a singing male in a spruce, and after establishing his location, he watched the bird through his glasses and took it to be a young male in immature plumage in full song. When he collected the bird it proved to be an adult female.

Passer domesticus domesticus (Linnaeus). ENGLISH SPARROW.—Schmitt (1904) collected a male and a female and saw another female at Ellis Bay in December, 1901.

**Euphagus carolinus* (Müller). RUSTY BLACKBIRD.—The Rusty Blackbird is not a very common species, as is attested by Lewis (1926) who saw but one at Port Menier; Lewis (1938b), however, saw 12 near Port Menier on July 16. Dionne (1920) "observed a small flock."

A few pairs of Rusty Blackbirds were noted by our party in the vicinity of the salt water lagoons of Fox River and, from their actions, appeared to be nesting or attending young. At the wooded edge of a muskeg south of the Eel Falls camp a pair harried our progress with open beaks and out-spread wings but we failed to find the nest. We collected 2 males at Fox Bay, June 23 to 24.

**Quiscalus aeneus* (Ridgway). BRONZED GRACKLE.—Lewis (1926) frequently observed this bird at Port Menier, but Dionne (1920) says it is apparently rare.

We found this species a little more numerous than the Rusty Blackbird and occupying the same general habitat. We observed the Bronzed Grackle at Ellis Bay on the southwestern point of the island, as well as on the north shore. On June 24, a juvenile grackle, barely able to fly, was noticed at the Fox Bay camp. We collected a male and a female at Fox Bay June 18 to 19.

Molothrus ater ater (Boddaert). EASTERN COWBIRD.—Lewis (1924) saw a male in a cage at Ellis Bay, taken on the island.

Hedymeles ludovicianus (Linnaeus). ROSE-BREASTED GROSBEAK.—Schmitt (1904), verified by Dionne, collected this species on Anticosti and lists it as rare.

Spiza americana (Gmelin). DICKCISSEL.—We quote from Lewis (1924), "Dionne: Accidental. Mr. La Brie found a specimen dead on the island. This specimen was examined by Dionne. This specimen is now mounted and in Mr. La Brie's private collection, where I have seen it."

**Carpodacus purpureus purpureus* (Gmelin). EASTERN PURPLE FINCH.—Lewis (1924) observed two at Ellis Bay June 14, 1922 and saw other locally captured caged individuals. Although Lewis (1926) saw several daily at Ellis Bay in late May, 1926, we found it only in the second growth spruce in the vicinity of the Fox Bay camp. Our records show but 6 individuals seen or heard, 3 of which we collected.

Pinicola enucleator eschatosus Oberholser. NEWFOUNDLAND PINE GROSBEAK.—Schmitt (1904) lists this species as fairly common throughout the year. Dionne (1920) found it fairly common.

Spinus pinus pinus (Wilson). NORTHERN PINE SISKIN.—Brewster (1884) found it in flocks on July 24 at Ellis Bay. Schmitt (1904) considered it a fairly common permanent resident bird, breeding on the island. Brooks (1919) saw a large flock September 3. Lewis (1924) observed 3 at Ellis Bay on June 14.

**Spinus tristis tristis* (Linnaeus). EASTERN GOLDFINCH.—Henry Mousley (1932) found this species common on August 23, near St. Lambert, Quebec, and states that many nest. Brewster (1884) found them common at Gaspé, Quebec, "but not common anywhere else on the Gulf of St. Lawrence." On Anticosti Island Dionne (1920) found it rare. Brooks (1919) "saw a small flock on September 3." Lewis (1924) saw two on June 14 and one June 15 at Ellis Bay.

Since the time of our visit on the island was a little ahead of the breeding season of this species, it may have been more abundant than our observations would indicate. On June 26 at Fox Bay a flock of 5 was noted and a female collected, while on June 28 a flock of approximately 40 was seen in the vicinity of Eel Falls camp.

Loxia leucoptera leucoptera (Gmelin). WHITE-WINGED CROSSBILL.—Brewster (1884) saw a flock of 8 or 10 at Ellis Bay on July 24. Schmitt (1904) writes "fairly common throughout the year." Lewis (1924) says Taverner saw 2 at Ellis Bay July 13, 1915. Brooks (1919) saw a single bird at Ellis Bay August 28, 1919. Dionne (1920) says that these crossbills were fairly common.

**Passerculus sandwichensis labradorius* Howe. LABRADOR SAVANNAH SPARROW.—The various observers of the avifauna of Anticosti agree on the abundance of this species. We found the Savannah Sparrow common inland, on the dryer areas surrounding the muskeg, as well as along the coast. In the vicinity of the Eel Falls camp on June 29 fifteen were observed, and in the numerous bogs bordering Fox River, several pairs were seen. On a low ridge between the sea and one of these bogs a nest with 3 fresh eggs was found, concealed in a tuft of grass. The nest was composed of coarse native grasses, becoming progressively finer inward, to the lining, which was composed of fine dry grasses. The outside dimensions of the nest were 6 inches across by 3 inches deep; the bowl had a diameter of 2¼ inches, and a depth of 1¼ inches. A nest found at Eel Falls June 29 contained 4 slightly incubated eggs. We collected 6 adult birds, 3 of each sex.

The discovery that the breeding Savannah Sparrows of Anticosti Island are *labradorius* extends the range of that form slightly southward from the Mingan Islands, where it was recorded by Peters and Griscom (1938).

**Junco hyemalis hyemalis* (Linnaeus). SLATE-COLORED JUNCO.—Verrill (1862a) found this species common in summer. Dionne (1920) and Schmitt (1904) report them common, while Lewis (1924) writes "not common at Ellis Bay in June, 1922."

Juncos proved to be fairly common in the dryer, sparsely wooded areas visited by us, as well as the wooded ridges. While no nests were found, it was noticeable that when seen, the birds were paired. We collected 5 males and one female.

Spizella arborea arborea (Wilson). EASTERN TREE SPARROW.—Verrill (1862a) found this species common and breeding; Brewster (1884) records one as collected. Dionne (1920) considers it rare. Lewis (1924) doubts that it breeds, though considers that it may to some extent.

Spizella passerina passerina (Bechstein). EASTERN CHIPPING SPARROW.—Lewis (1924) heard and saw 2 males in song at Ellis Bay on June 14 and again on June 15, 1922. Lewis (1926) records one individual at Port Menier on May 30, 1926.

Zonotrichia leucophrys leucophrys (Forster). WHITE-CROWNED SPARROW.—Schmitt (1904) and Dionne (1920) both list it as rather rare. In 1922 Lewis (1924) was shown a locally taken caged bird and on his later trip (1926) found the species in small numbers from May 20 to June 1.

**Zonotrichia albicollis* (Gmelin). WHITE-THROATED SPARROW.—Verrill (1862a) writes of this species "By far the most common singing bird on Anticosti." All other writers agree as to its abundance.

We also found the White-throated Sparrow an abundant bird in the vicinity

of both our camps, occurring in the dry localities of the grassy, second growth spruce areas, as well as the dry grassy borders of the muskegs. Its nests were on the ground, well concealed in the high grass at the bases of spreading spruce saplings. A male sang continuously during the daylight hours scarcely a 100 feet south of our Fox River camp, and though we spent several hours from time to time attempting to discover a nest, we were unsuccessful. We took 5 specimens at Fox Bay, June 18 to 23.

**Passerella iliaca iliaca* (Merrem). EASTERN FOX SPARROW.—A variance of opinion exists among the previous observers of Anticosti Island birds in regard to the abundance of this species. Verrill (1862a) reports it common and breeding; Brewster (1884) found it "Particularly abundant at Fox Bay"; Dionne (1920), Brooks (1919), and Lewis (1924), found it common. Schmitt (1904), on the other hand, considered it rather rare. We found the Fox Sparrow uncommon and observed it only in the vicinity of the Fox Bay camp and along the sea coast. Our records show a total of but 6 individuals seen or heard. On June 30, at Deep Bay (9 miles west of Fox River) a pair was seen feeding fully feathered young. We collected 2 adult males and a juvenile female at Fox Bay, June 23 to 26.

Verrill (1862b) described a new species of *Passerella* from Anticosti Island, but subsequent examination of the type by Bangs (1930) has shown it to be an immature specimen of *iliaca*.

Melospiza lincolni lincolni (Audubon). LINCOLN'S SPARROW.—Brooks (1919) collected a female September 6. Lewis (1926) saw one at Port Menier on May 23, and again on May 29; also he (1938b) heard two singing there July 16, 1938.

**Melospiza georgiana ericrypta* Oberholser. WESTERN SWAMP SPARROW.—Lewis (1924) found the Swamp Sparrow rather common at Ellis Bay in June, 1922. Brewster (1884) lists it as abundant. Schmitt (1904) reports it as rare in summer. Dionne (1920) writes "Fairly common." Brooks (1919) says, "Apparently rare. One taken at Ellis Bay September 5."

We found the Swamp Sparrow fairly common and in about equal numbers at the Eel Falls camp and the Fox Bay camp. It definitely preferred the wet grassy areas of the muskeg and the boggy marshlands along the coast line. We collected 5 males and 3 females at Fox Bay, June 18 to 28. Nests were situated 6 to 12 inches above the ground in the thick high grass, usually under dwarf spruces. A nest collected June 24 is similar in construction to that of the Savannah Sparrow and measured 4½ inches in diameter by 2¼ inches deep, with a bowl diameter of 2¼ inches and a depth of one inch. This nest contained 4 fresh eggs as did another nest found there June 19.

The discovery that the breeding swamp Sparrows of Anticosti Island are *Melospiza georgiana ericrypta* Oberholser (1938) extends the range of that supposedly western form from the prairie region of Canada to the Gulf of St. Lawrence, and is one more example of the discovery in northeastern America of subspecies first described from the west. It still remains to be demonstrated, however, that the ranges of these western forms across Canada to the Atlantic Coast are continuous.

Melospiza melodia melodia (WILSON). EASTERN SONG SPARROW.—Dionne (1920) records this bird as very rare. Lewis (1924) saw a singing male at Ellis Bay June 14 and 15, 1922. Lewis (1926) writes, "Remains rare in the vicinity of Port Menier. But three individuals recorded."

This bird proved an elusive species which defied our collecting. It was heard singing on two occasions and was seen on two others, between June 18 and 22.

Calcarius lapponicus lapponicus (Linnaeus). LAPLAND LONGSPUR. Dionne (1920) lists it as common, presumably in migration only.

Plectrophenax nivalis nivalis (Linnaeus). EASTERN SNOW BUNTING.—Schmitt (1904) and Dionne (1920) list this species as common during migration, spring and fall. Lewis (1926) saw a flock of thirteen on May 20, fifteen on May 21.

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CLEVELAND, OHIO

ORNITHOLOGICAL NEWS

During the month of April the American Museum of Natural History exhibited a "one-man show" of bird paintings by George Miksch Sutton.

Paul Geroudet, editor of *Nos Oiseaux*, has been mobilized and Alfred Mayor is assuming his duties for the present.

Dr. Stresemann writes that Dr. H. Sick is "still in eastern Brasil, unable to return from there and is making the best use of his time by studying the life history of various tropical birds, especially the Pipridae."

The program of the Eighth American Scientific Congress held in Washington May 10 to 21 included ornithological papers by Frank M. Chapman, I. N. Gabrielson, Ludlow Griscom, W. H. Phelps, Oliverio Pinto, and William Vogt.

Many of our readers will probably be surprised to learn that Florence M. Bailey's "Birds of New Mexico" is still available at the original price of $5.00 ($10.00 for the deluxe edition). Orders should be directed to the "Department of Game and Fish, Santa Fe, New Mexico."

GENERAL NOTES

Leach's Petrel in Ontario.—On July 19, 1939, A. Burrelle of Cornwall, Ontario, took the first Leach's petrel, *Oceanodroma l. leucorhoa*, to be recorded for the Province. Mr. Burrelle noted the bird as different, picked it up and mounted it for preservation. It was found about two miles below Cornwall, Stormont County, on the St. Lawrence river and the mount is now in the Royal Ontario Museum of Zoology.

Weather conditions, gales blowing inland from the seas, are supposed to be responsible for such oceanic strays. In this instance the weather had been fine for a number of days previously. A. J. Connor, Meteorological Division, Department of Transport, Canada, states in a letter: "For some days prior to the 19th there was a general tendency to north and northwest winds in the region of the Ottawa river, while about 8 A.M., on this date, the wind over Lake Ontario changed to a southerly direction for a few hours."—G. C. Toner, *Cataraqui, Ontario.*

European Widgeon at Pymatuning Lake, Pennsylvania.—On April 27, 1940, a male European Widgeon (*Mareca penelope*) was seen on the west shore of Pymatuning Lake by the writer, Vera Carrothers, Margarette Morse, and Mrs. Skaggs. The bird was viewed at about 80 feet in a good light and was in company with about 35 Baldpates. All of the ducks were in a little puddle in a field about 150 yards from the Ohio state line and were observed from our auto on U.S. highway No. 322.—M. B. Skaggs, *Julian Road, South Euclid, Ohio.*

Crow Depredation on Heron Nesting Colonies.—In April 1939, a large colony of Little Blue Herons (*Florida caerulea*) and Snowy Egrets (*Egretta thula*) was found nesting in an "island" of timber known as the "Live Oaks" on the coastal prairie 9 miles south of Waller in Waller County, Texas. Within the woods, which covers about 300 acres, the land is low and poorly drained, and a creek which flows through the area spreads out to form several meanders. The birds were first observed on April 4 by Valgene W. Lehmann and the writer, and by April 10, approximately 1,500 Little Blue Herons and 3,000 Snowy Egrets were breeding. Their nests were concentrated in an area covering less than one acre. Nests were constructed in trees and shrubs from 6 to 30 feet above ground.

Crows (*Corvus brachyrhynchos*) discovered the nests before egg laying was completed, and by April 17 every nest containing heron and egret eggs had been destroyed. The only evidence remaining of their attempt to nest was empty nests and broken shells covering the ground. Most of the birds lingered about the area for some time; on April 20 many were seen congregated at ponds and along the winding creek. By April 30, however, 90 per cent of the herons and egrets had left the place.

Approximately 750 Black-crowned Night Herons (*Nycticorax naevius*) and 1,000 Yellow-crowned Night Herons (*Nyctanassa violacea*) also were observed nesting at the "Live Oaks." The Night Herons began nesting shortly before the Blue Herons and Egrets, and by April 20 most of the birds had been incubating eggs for some time. They were not nesting in a concentrated group. The nests, usually 30 feet or more above the ground, were spread throughout the area with never more than three or four in a single tree or group of trees. Crows were seen to attack Night Heron nests as early as April 20, although remains of from one to four eggs which were found beneath trees containing Night Heron nests gave evidence that predation had been going on prior to that date. The herons paid little attention to the Crows and permitted as many as two at one time to raid a nest and carry off eggs in their beaks. Several hours of observation on April 26

showed that Night Heron nests were not being molested seriously, and later observations indicated that many of the nests were escaping the ravages of the Crows.

The total number of Crows inhabiting the "Live Oaks" was estimated at less than 40. These apparently were breeding at the time of the nesting of the herons; one nest was found. Crows were observed to carry off eggs of the herons in their beaks and also to eat their contents at the victim's nest. Observations and broken shells examined indicated that the damage was done almost entirely by Crows. Several hundred Turkey and Black Vultures roosted at the area, but they were not seen to take part in the destruction. Blue Jays were common in the woods too, but none was observed at heron nests and two stomachs examined revealed no evidence of eggs. Mammals were probably responsible for some damage, since droppings (thought to be those of either racoon or opossum) containing heron egg shells were found in the fork of a live oak tree.

It appears, then, that Crows may be destructive to concentrated nesting colonies of Little Blue Herons and Snowy Egrets whose eggs form a readily available food supply for the young, but considerably less destructive to Night Herons whose breeding habits do not limit them to such small areas.—ROLLIN H. BAKER, *Texas Cooperative Wildlife Research Unit, College Station, Texas.*

English Sparrow with an Abnormal Bill.—After seeing a notice in the "Martinsburg Journal" of the finding of a strange bird which appeared to be "a cross between a starling and a sparrow," I went to Mr. Clowser who had kept the "hybrid" in a glass jar outside the window of his barber shop. The bird proved

Figure 1. Sickle-billed English Sparrow.

to be an adult male English Sparrow, *Passer domesticus*.

The bird was caught in the Central Theater, in Martinsburg, West Virginia, on the morning of January 16, 1940, and it was thought to have gotten into the building through a ventilator fan. Mr. Clowser took the bird to his shop, hoping that it would survive. It was fed that day and Mr. Clowser stated that the sparrow turned its head sideways while eating. The next day it died.

In the picture there is noticeable the head of a pin which was run through the orbits to hold the bird to the backboard while it was photographed. The curved length of the upper mandible measured 36 mm. The lower mandible seemed to be somewhat atrophied. Unfortunately, I was unable to obtain the bird for a more complete examination and dissection. Aside from the deformed beak it appeared to be quite normal. J. Lloyd Poland, *Department of Botany and Zoology, West Virginia University, Morgantown, West Virginia.*

Mississippi Bird Records.—I wish to thank Dr. Alexander Wetmore, U.S. National Museum, Washington, D.C., for these subspecific identifications and for confirming my identification of the Swainson's Warbler.

Sanderling, *Crocethia alba*. A specimen was collected August 17, 1939, at Legion Lake, two miles south of Rosedale, and is probably the first one collected in this section of the state.

Northern Carolina Chickadee, *Penthestes carolinensis extimus*. This form has not heretofore been reported from the state. A bird was found dead on the highway just south of Columbus, Mississippi, April 29, 1932, and proved to be *extimus*.

Swainson's Warbler, *Limnothlypis swainsoni*. A bird collected July 17, 1939, a male, was this species. A pair was noted at the time. The specimen was in partial moult and probably nested in the small woods where collected. It was taken one-half mile south of Moorhead, Sunflower County.

Labrador Savannah Sparrow, *Passerculus sandwichensis labradorius*. A bird taken January 7, 1937, a female, at Legion Lake, two miles south of Rosedale was identified as this form. I find no record of this race having been taken in the state.—M. Gordon Vaiden, *Rosedale, Bolivar County, Mississippi.*

Wilson Ornithological Club Library

The following gifts have been received:
Herbert Brandt—"Texas Bird Adventures."
Ducks Unlimited—"1938–1939 Census and Record Book."
James C. Greenway—1 reprint.
R. A. Johnson—8 reprints.
Leon Kelso—1 reprint.
Margaret M. Nice—complete set of own reprints.
Frank A. Pitelka—8 reprints.
Dayton Stoner—1 bulletin
E. L. Sumner, Jr.—1 reprint.
Texas Game, Fish and Oyster Commission—4 pamphlets.
W. J. Willis—50 magazines.

EDITORIAL

Our Associate Editor, Margaret Nice, reminds us that many Wilson Club members are in a position to gather important bits of missing data on the breeding habits of American birds but are often failing to do so because they overlook the need.

Some of the chief lacks in our knowledge of even common species are accurate records on: size and method of choosing and defending territory; exact share of the sexes in nest-building, incubation, and in care of the young; length of incubation period; time of laying individual eggs; length of time young stay in the nest; age when young become independent; and number of broods raised.

Many of these points are not known for species that are very familiar to most of us. Even if someone has already published on some of these items for the species you are studying, it will be well to check to confirm or correct that data.

The utmost accuracy and attention to detail is essential when gathering such data. For example, the incubation period should be counted from the laying of the last egg to the hatching of that egg. Or it may be counted from the laying to the hatching of a given marked egg, provided there is exact information on the time when incubation began. As soon as each egg is laid it can be marked with India ink, using a grass stalk as a pen.

We are indebted to Frank W. Braund and E. Perry McCullagh for assistance which enables us to print more pages this month without extra strain on the Club's slender resources.

The Local Committee on Arrangements for the Annual Meeting in Minneapolis next fall has been holding preliminary meetings and reports that headquarters will be next to the Museum of Natural History in a building known as the "Center for Continuation Study." Rooms and meals will be available there at reasonable rates.

The meeting promises to be an unusually interesting one and members should begin to make plans to attend this, our first Minnesota meeting.

OBITUARY

Dr. Wilfred A. Welter of Morehead, Kentucky, was killed in an automobile accident near Chicago on December 20, 1939. He was Professor of Biology at Teachers College, Morehead, and had published several ornithological papers in *The Wilson Bulletin* and other journals.

Albert R. Brand of Cornell University died March 28, 1940, at his home in Ithaca after a long illness. He was formerly a banker and stock broker in New York City and after retiring from business at the age of 40, had become an outstanding authority on the recording and study of bird song by means of sound film.

The Rev. F. C. R. Jourdain, the eminent authority on the life histories of European birds, died in England on February 27, 1940.

Henrik Grönvold, the celebrated bird artist, died in England on March 22, 1940, at the age of 81. Although born and trained in Denmark, he had lived in England since 1892.

ORNITHOLOGICAL LITERATURE [1]

FALCONRY. A HANDBOOK FOR HUNTERS. By William F. Russell, Jr. Drawings by W. D. Sargent and photographs by the author. Charles Scribner's Sons, New York, 1940: 6 x 9 in., ix + 180 pp., 6 pls., 12 figs. $2.50.

With the ever increasing interest in birds as a source of recreation and study, it is quite likely that the ancient sport of falconry will again come into its own. In fact, if this inspiring book on falconry reaches the hands of bird-lovers and sportsmen with ample leisure time, it is safe to say that it will come into its own very soon.

Mr. Russell has written this book for the beginner. After considering in his first chapter the four problems with which the prospective falconer is faced, namely, leisure time, what to catch, where the sport may be practiced, and learning how to train and hunt with falcons, he presents a series of chapters dealing with an orientation in the field of hawks, methods of trapping, "manning," and training hawks, the various techniques in hunting such birds as crows, magpies, and game, and the care and management of hawks. He devotes his final chapter to a description of implements and to a glossary. The beginner will find this glossary indispensable since the author faithfully uses the traditional terminology of the sport.

Ornithologists and bird-lovers who are skeptical of falconry, thinking it a cruel sport or a subversive influence in the conservation of hawks, must read this book. They will find that the successful falconer has a deep affection for his birds and gives tireless consideration for their well-being and comfort. Furthermore, they will find that falconry indirectly encourages hawk conservation. A falconer must obtain his hawks alive, either by trapping (a tedious and difficult task in itself), or by taking "eyases" from the nests. Consequently there must be a constant supply of them. Ruthless shooting of hawks decreases his chances of successfully trapping a few individuals; taking all young from nests discourages renesting on succeeding years. In other words, a falconer is interested in perpetuating hawks rather than in wiping them out!

This book contributes considerable interesting information to our knowledge of hawks, particularly their behavior and feeding habits. Ornithologists, however, will be likely to question a number of statements made by the author. For instance, he intimates (p. 13) that "old hawks" in the wild lose their fear of man Accipiters (p. 23) soar in the air only to cool themselves. The tooth on the upper mandible of the falcon's bill (p. 22) is used to sever the spinal cord in the neck of their prey, thus bringing about a quick and painless death, whereas the Accipiters (p. 23), whose beaks are not adapted for severing the spinal cords of their prey, must kill by the pressure which their powerful feet and talons can produce.

The most important treatises on falconry are listed in a brief bibliography. As the author states elsewhere in his text, all of them are either out of print or difficult of access. The well-known article by Louis Agassiz Fuertes, "Falconry, the Sport of Kings," (*Nat. Geogr. Mag.*, 38, 1920), is not included. This article together with the present book constitute the only two important treatises on falconry yet published in America. There is an adequate index.—O. S. Pettingill, Jr.

BIRDS OF THE UPPER PENINSULA OF MICHIGAN. By Leonard Wing. Research Studies of State College of Washington, **7**, No. 4, Dec., 1939 [published about Apr. 1, 1940] :163–98, map.

The birds of the Upper Peninsula of Michigan are but poorly known and the present paper is a much needed contribution to the subject. Its title is perhaps slightly mis-leading for there is no attempt to list all species known in that area.

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[1] For additional review see page 90.

This is purely a combined report on the author's five trips, totaling about 82 days in the 16,000 square mile area.

Dr. Wing has been too modest in refraining from indicating the significance of some of his records. They include for example, the first Sharp-tailed Grouse specimen from the mainland of Michigan, the first Brewer's Blackbird record for Michigan, and the first Michigan breeding records of Blue-headed Vireo and Western Meadowlark.

Unfortunately the many signs of failure to check proof on the paper weaken our confidence in any given piece of data. Fourteen errors in 131 scientific names are too many. Also in Table 4, Tree Swallow appears as "Tree Sparrow"; and in Table 6, for the first "Black-throated Green Warbler listed (4d) one should read Black-throated Blue Warbler. On page 174, Blue-winged Teal is called *Nettion carolinense*. The second quarter of page 197 duplicates the first quarter. "Wilson's Thrush" of Tables 3, 4, 6, and 8 is apparently the equivalent of Willow Thrush of page 188.

The author has made a praiseworthy attempt to give in tabular form exact data on relative abundance of birds but his tables are inadequately labeled and those based on as little as six days' observation do not seem very significant.

In his discussion of geographical variation in *Dryobates villosus* Dr. Wing gives us nothing new except the strange and wholly unauthorized use of the word "intermediation" as a synonym for "intergradation."

It is regrettable that the author does not indicate which records are based on specimens collected.

The section on the Canada Jay is based entirely on second-hand data from untrained observers, and the taxonomic discussion of Michigan ravens loses much significance when we know that all of the specimens examined were of immature birds.

When we add to the above a count of a dozen additional misprints, we must conclude that even after seven years' delay Dr. Wing has published this paper a little too hastily.—J. Van Tyne.

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———. A Race of the Warbling Vireo from Guerrero, Mexico. *Trans. San Diego Soc. Nat. Hist.*, **9**, No. 16, April 30, 1940: 77–8. (*Vireo gilvus connectens* subsp. nov. from Chilpancingo, Guerrero).

———. Notes on Some North American Birds of the Genera Myiodynastes, Pitangus, and Myiochanes. *Ibid.*, **9**, No. 17, April 30, 1940: 79–86. (New subspecies are: *Pitangus sulphuratus texanus* from Brownsville, Texas; and *Myiochanes virens placens* from Santa Rita Mts., Ariz.).

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WOODRUFF, NATHAN H. Mathematics Used in Biology. *Jour. Tenn. Acad. Sci.*, **15**, No. 2, Apr., 1940: 177–266.

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Life Members

Bretsch, Clarence, 690 Broadway, Gary, Indiana 1925
Ellis, Ralph, Jr., 2420 Ridge Rd., Berkeley, California 1926
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McIlhenny, Edward Avery, Avery Island, Louisiana 1910
Rogers, Charles Henry, Princeton Museum of Zoology, Princeton, New Jersey 1903
Sherman, Miss Althea Rosina, National via McGregor, Iowa 1902
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Taylor, Mrs. H. J., 900 Santa Barbara Rd., Berkeley, California 1916
Tucker, Mrs. Carll, Penwood, Mount Kisco, New York 1928

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Bailey, Harold H[arris], 820 Alhambra Circle, Coral Gables, Florida 1908
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Barnes, Ventura, Jr., % William H. Phelps, Almacen Americano, Caracas, Venezuela, South America 1938
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Brandreth, Courtenay, Ossining, New York 1939
Cahn, Dr. Alvin Robert, Forestry Bldg., Norris, Tennessee 1914
Chambers, Willie Lee, 2068 Escarpa Dr., Eagle Rock, Los Angeles, California..1934
Coursen, Charles Blair, 761 E. 69th Pl., Chicago, Illinois 1927

[1] This list is complete to May 1, 1940. The Secretary would appreciate immediate notification of any omission of names and changes in address, or any errors in the spelling of names, the use of titles, and the exact years of first election to membership. The Secretary wishes to have the *full* names of all members.

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Goetz, Christian John, 3503 Middleton Ave., Cincinnati, Ohio 1930
Greene, Albert E., 1841 Cambridge Rd., Ann Arbor, Michigan 1939
Harper, Harry F., 1408 Cambridge Rd., Lansing, Michigan 1938
Harriot, Samuel Carman, 200 W. 58th St., New York, New York 1934
Harris, Dr. Arthur Trevenning, 700 Van Buren St., Gary, Indiana 1930
Havemeyer, Henry Osborne, Mahwah, New Jersey 1930
Mitchell, Dr. Walton Iungerich, 398 Vassar Ave., Berkeley, California 1893
Mudge, Edmund W., Jr., 811 Gulf States Bldg., Dallas, Texas 1939
Nelson, Dr. Theodora, 2695 Heath Ave., New York, New York 1928
Philipp, Philip Barnard, 27 West 44th St., New York, New York 1914
Procter, William, 430 Park Ave., New York, New York 1937
Roberts, Dr. Thomas Sadler, Museum of Natural History, University of Minnnesota, Minneapolis, Minnesota 1914
Shearer, Dr. Amon Robert, Mont Belvieu, Chambers Co., Texas 1893
Stoddard, Herbert Lee, Route 5, Sherwood Plantation, Thomasville, Georgia..1916
Sutton, Dr. George Miksch, Laboratory of Ornithology, Cornell University, Ithaca, New York 1920
Swenk, Myron Harmon, 1410 N. 37th St., Lincoln, Nebraska 1914
Todd, Walter Edmond Clyde, Carnegie Museum, Pittsburgh, Pennsylvania....1911
Uhrig, Mrs. A. B., 425 E. Water St., Oconomowoc, Wisconsin 1926
Vandervort, Charles Champion, Laceyville, Pennsylvania 1937
Van Tyne, Mrs. C. H., 5017 Blackstone Ave., Chicago, Illinois 1939
Welsh, William W., 76 Norfolk Rd., Clarendon Hills, Illinois 1939
Wineman, Andrew, 150 Michigan Ave., Detroit, Michigan 1934
Young, Colonel John Paul, No. 1 Grove Place, Ithaca, New York 1913

Active Members

Abbott, Dr. Cyril Edward, Harding College, Searcy, Arkansas 1937
Aldrich, Dr. John Warren, Cleveland Museum of Natural History, Cleveland, Ohio 1930
Allen, Dr. Arthur Augustus, Laboratory of Ornithology, Cornell University, Ithaca, New York 1914
Alperin, Irwin, 1100 E. 19th St., Brooklyn, New York 1939
Armstrong, Miss Virginia, Musketaquid Rd., Concord, Massachusetts 1939
Bailey, Alfred Marshall, Colorado Museum of Natural History, Denver, Colorado 1928
Ballard, Mrs. Rosamond Lockett, Avery Island, Louisiana 1939
Barber, Dr. Bertram Alpha, 350 West St., Hillsdale, Michigan 1923
Bartel, Karl [Emil] Edgar, 2528 W. Collins St., Blue Island, Illinois 1934
Bartlett, Guy, Rosendale Rd., Route 1, Schenectady, New York 1938
Bartlett, Wesley Hamilton, Primghar High School, Primghar, Iowa 1936
Bartsch, Dr. Paul, U. S. National Museum, Washington, D.C. 1894
Beckhart, Carleton A[llen], Box 83, Barrington, Illinois 1939
Bennett, Miss Mary Allison, 623 E. Carroll St., Macomb, Illinois 1933
Bennitt, Dr. Rudolf, Department of Zoology, University of Missouri, Columbia, Missouri 1932
Bent, Arthur Cleveland, 140 High St., Taunton, Massachusetts 1893
Berthel, Russell M[essner], 501 Portland Ave., St. Paul, Minnesota 1939
Billington, Cecil, 21060 Thirteen Mile Rd., Birmingham, Michigan 1939
Blain, Dr. Alexander Willis, 2201 Jefferson Ave., E., Detroit, Michigan 1902
Blake, Emmet R[eid], Field Museum of Natural History, Chicago, Illinois...1939

Boggs, J. B., Morgantown, West Virginia 1938
Bole, Benjamin Patterson, Jr., 2717 Euclid Ave., Cleveland, Ohio 1938
Bowman, Lawrence Lincoln, Orchard Hills, Route 7, North Canton, Ohio.... 1935
Brant, Irving, 630 F St. N.E., Washington, D.C. 1932
Breckenridge, Walter John, Museum of Natural History, University of Minnesota, Minneapolis, Minnesota 1929
Brodkorb, Dr. [William] Pierce, Museum of Zoology, Ann Arbor, Michigan.. 1936
Brooks, Earle Amos, 166 Plymouth Rd., Newton Highlands, Massachusetts... 1933
Brooks, Maurice [Graham], Division of Forestry, West Virginia University, Morgantown, West Virginia 1934
Bryens, Oscar McKinley, McMillan, Luce Co., Michigan 1924
Burch, Mrs. Jessie Kate [Mrs. George D.], 75 Woolnough Ave., Battle Creek, Michigan 1938
Burleigh, Thomas Dearborn, Oakhurst Route, Gulfport, Mississippi 1922
Burtch, Verdi, Branchport, New York 1924
Carpenter, F. S., 2402 Longest Ave., Louisville, Kentucky 1934
Chapman, Dr. Frank Michler, American Museum of Natural History, New York, New York 1910
Chase, Henry B., Jr., So. Biological Supply Co., New Orleans, Louisiana..... 1932
Chatham, Richard Thurmond, Jr., 112 Stratford Rd., Winston-Salem, North Carolina 1939
Christy, Bayard Henderson, % Christy and Wharton, 2203 7th Farmers Bank Bldg., Pittsburgh, Pennsylvania 1932
Clark, W. Kimball, Jr., Wildlife Conservation Bldg., University of Missouri, Columbia, Missouri 1939
Coffey, Ben Barry, Jr., Inspection Bureau, 1434 Bank of Commerce Bldg., Memphis, Tennessee 1927
Cole, Dr. Leon Jacob, University of Wisconsin, College of Agriculture, Agriculture Hall, Department of Genetics, Madison, Wisconsin 1921
Cook, Miss Fannye Addine, State Game and Fish Commission, Jackson, Mississippi 1925
Cottam, Dr. Clarence, Bureau of Biological Survey, Washington, D.C..... 1929
Cox, William Thomas, 2186 Doswell Ave., St. Paul, Minnesota 1936
Cruickshank, Allan Dudley, National Association of Audubon Societies, 1006 Fifth Ave., New York, New York 1939
Deaderick, Dr. William Heiskell, 36 Circle Dr., Hot Springs, Arkansas..... 1936
Decker, C. O., 6450 Kenwood Ave., Chicago, Illinois 1938
Dickinson, Francis Reynolds, 1518 Astor St., Chicago, Illinois 1931
Dodge, Victor Kenney, 137 Bell Court W., Lexington, Kentucky 1935
DuMont, Philip Atkinson, 405 N. Cleavland St., Arlington, Virginia 1928
Duncan, Donald Pendleton, Forest Service, Meade, Kansas 1936
Edeburn, Dr. R[alph] M[ilton], 1015 2nd St., Beaver, Pennsylvania 1939
Edge, Mrs. Charles Noel, 1200 5th Ave., New York, New York 1931
Edge, Peter, 1200 5th Ave., New York, New York 1939
Eifrig, Prof. Charles William Gustave, 1029 Monroe Ave., River Forest, Illinois 1907
Ekblaw, Dr. George Elbert, 511 W. Main St., Urbana, Illinois 1914
Ekblaw, Dr. Walter Elmer, Clark University, Worcester, Massachusetts 1910
Emerson, Guy, 16 Wall St., New York, New York 1938
Emilio, Shepard Gilbert, 7 Winter St., Salem, Massachusetts 1929
English, Dr. Pennoyer Francis, Department of Zoology, Pennsylvania State College, State College, Pennsylvania 1934
Errington, Dr. Paul L[ester], Iowa State College, Ames, Iowa 1932
Feeney, W. S., Westmorland, Madison, Wisconsin 1937
Fleming, James Henry, 267 Rusholme Rd., Toronto 4, Ontario, Canada..... 1906

Floyd, Judge Joseph Larke, 1009-11 George D. Harter Bank Bldg., Canton, Ohio 1903
Fredine, C[larence] Gordon, 1807 Wesley Ave., St. Paul, Minnesota 1938
Gabrielson, Dr. Ira Noel, Bureau of Biological Survey, Washington, D.C. 1913
Gault, Benjamin True, 413 Hill Ave., Glen Ellyn, Illinois 1895
Gray, William Arthur, Room 690, 508 S. Dearborn St., Chicago, Illinois 1938
Gregory, Stephen Strong, Jr., Box N, Winnetka, Illinois 1922
Grimm, William C[arey], 101 Climax St., Pittsburgh 10, Pennsylvania 1939
Griscom, Ludlow, Museum of Comparative Zoology, Cambridge, Massachusetts 1937
Haecker, Frederick Woods, 506 S. 52nd St., Omaha, Nebraska 1938
Hamerstrom, Frederick N., Jr., Plainfield, Wisconsin 1934
Hand, Ralph Levi, 543 S. 5th St. W., Missoula, Montana 1933
Handlan, John Welty, 91 Lynwood Ave., Wheeling, West Virginia 1932
Handley, Charles Overton, Virginia Polytechnic Institute, Blacksburg, Virginia. 1925
Hann, Dr. Harry Wilbur, Department of Zoology, University of Michigan, Ann Arbor, Michigan 1930
Hartshorne, Charles, Faculty Exchange, 5750 Ellis Ave., University of Chicago, Chicago, Illinois 1938
Hendrickson, Dr. George Oscar, Department of Zoology, Iowa State College, Ames, Iowa 1933
Herrick, Dr. Francis Hobart, 2863 Noble Rd., Cleveland Heights, Ohio 1917
Heston, Dr. Walter Enoch, Jackson Memorial Laboratory, Bar Harbor, Maine. 1936
Himmel, Dr. Walter J., 1326 Idylwild Dr., Iowa City, Iowa 1915
Hinds, Frank J., Department of Biology, Western State Teachers College, Kalamazoo, Michigan 1935
Hinshaw, Thomas Doane, 1908 Scottwood Ave., Ann Arbor, Michigan 1926
Howell, Arthur Holmes, 2919 S. Dakota Ave., Washington, D.C. 1921
Hunt, Ormond Edson, 14-133 General Motors Bldg., Detroit, Michigan 1937
Imler, Ralph Hysel, Food Habits Research Laboratory, 562 Custom House, Denver, Colorado 1937
Jackson, Cicero Floyd, University of New Hampshire, Durham, New Hampshire 1936
Jamison, Conrad Haston, 2811 Acklen Ave., Nashville, Tennessee 1940
Jenner, William Alexander, 806 W. Davis St., Fayette, Missouri 1933
Johnson, Robert Anthony, 150 East St., Oneonta, New York 1930
Jones, Harold Charles, Thomas Berry College, Mount Berry, Georgia 1929
Jung, Clarence Schram, Station F, Route 9, Box 670, Milwaukee, Wisconsin.. 1921
Kalmbach, Edwin Richard, 527 Custom House, Denver, Colorado 1926
Kase, John Charles, The Union Club, Purdue Memorial Union, Lafayette, Indiana 1937
Kelker, George Hills, School of Forestry, U.S.A.C., Logan, Utah 1938
Kelso, Leon, 1370 Taylor St. N.W., Washington, D.C. 1930
Kendeigh, Dr. S[amuel] Charles, Vivarium Bldg., Wright and Healey Sts., University of Illinois, Champaign, Illinois 1923
Knappen, Miss Phoebe Malura, 2925 Tilden St. N.W., Washington, D.C. 1926
Komarek, Roy Vance, Florida Commission of Game and Fresh Water Fish, Tallahassee, Florida 1935
Kutz, Harry Leon, Laboratory of Ornithology, Cornell University, Ithaca, New York 1939
Lambert, Bert, Allenville, Michigan 1936
Larrabee, Prof. Austin Park, Yankton College, Yankton, South Dakota 1921
Laskey, Mrs. Amelia Rudolph (Mrs. Frederick Charles), Graybar Lane, Nashville, Tennessee 1928

Leopold, Prof. Aldo, 424 University Farm Place, University of Wisconsin, Madison, Wisconsin 1928
Lewy, Dr. Alfred, 2051 E. 72nd Place, Windsor Park, Chicago, Illinois 1915
Ludwig, Claud Charles, 506 Wilson Bldg., Lansing, Michigan 1938
Magee, Michael Jarden, 603 South St., Sault Ste Marie, Michigan....1919
Mailliard, Joseph, 1815 Vallijo St., San Francisco, California 1930
Manweiler, J[ack], Soil Conservation Service, Baudette, Minnesota 1939
Mayfield, Dr. George Radford, Vanderbilt University, Nashville, Tennessee..1917
McAtee, Waldo Lee, Bureau of Biological Survey, Washington, D.C. 1911
McCracken, Dr. Isabel, Box 1545, Stanford University, California 1936
McCreary, Otto, Agricultural Hall, University of Wyoming, Laramie, Wyoming 1930
McCullagh, Dr. E[rnest] Perry, 2020 E. 93rd St., Cleveland, Ohio 1937
McKnight, Edwin Thor, 5038 Park Place, Friendship Station, Washington, D.C. 1936
McMath, Robert R., Route 4, Pontiac, Michigan 1934
Merry, Miss Katherine, 268 Auburn Ave., Pontiac, Michigan 1938
Metcalf, Dr. Zeno Payne, State College, West Raleigh, North Carolina 1900
Meyer, Henry, Zoology Department, University of Tennessee, Knoxville, Tennessee 1939
Minich, Edward C., 1047 Fairview Ave., Youngstown, Ohio 1923
Mitchell, Mrs. Margaret Knox Howell, 49 St. Clair Ave. W., Apt. 405, Toronto, Ontario, Canada 1933
Moffitt, James, 1879 Broadway, San Francisco, California 1931
Monk, Harry Crawford, 3108 Long Blvd., Nashville, Tennessee 1920
Monroe, Burt Leavelle, Ridge Road, Anchorage, Kentucky 1935
Moore, Miss Clara Alma, 3510 W. Michigan St., Indianapolis, Indiana 1939
Morse, Miss Margarette Elthea, 11432 Mayfield Rd., Cleveland, Ohio 1921
Moseley, Edwin Lincoln, State College, Bowling Green, Ohio 1925
Moser, Dr. R[euben] Allyn, Suite 612, 1504 Dodge St., Omaha, Nebraska....1940
Musgrave, Dr. John Knox, 350 Parkway Dr., Pittsburgh 16, Pennsylvania....1937
Neely, William W., 149 W. End St., Chester, South Carolina 1939
Neff, Johnson Andrew, Box 1317, Sacramento, California 1920
Newth, Donald Jennings, 480 W. Kirby St., Detroit, Michigan 1939
Nice, Dr. Leonard B., 5708 Kenwood Ave., Chicago, Illinois 1932
Nice, Mrs. Margaret Morse, 5708 Kenwood Ave., Chicago, Illinois 1921
Nichols, Charles Ketcham, 212 Hamilton Rd., Ridgewood, New Jersey 1933
Norse, William J[ohn], 531 W. 211th St., New York, New York 1939
Oberholser, Dr. Harry Church, 2805 18th St., N.W., Washington, D.C. 1894
Ohern, D. W., 515 N.W. 14th St., Oklahoma City, Oklahoma 1938
Olsen, Dr. Richard Ellsworth, St. Joseph's Hospital, Pontiac, Michigan....1937
Osgood, Dr. Wilfred Hudson, Field Museum of Natural History, Chicago, Illinois 1910
Otis, Dr. Charles Herbert, Department of Biology, Bowling Green State University, Bowling Green, Ohio 1937
Palcich, Edward A[ndrew], Hawley High School, Hawley, Minnesota 1939
Palmer, Dr. Theodore Sherman, 1939 Biltmore St. N.W., Washington, D.C. ..1914
Park, Mrs. A. S., 1627 Sherwin Ave., Chicago, Illinois 1938
Pearce, John, 335 Prospect St., New Haven, Connecticut 1939
Pemberton, John Roy, 3031 N. Lake Ave., Altadena, California 1922
Perkins, Samuel Elliott, III, 709 Inland Bldg., Indianapolis, Indiana 1923
Pettingill, Dr. Olin Sewall, Jr., Department of Zoology, Carleton College, Northfield, Minnesota 1930
Phillips, Allan Robert, 113 Olive Rd., Tucson, Arizona 1934
Pickwell, Dr. Gayle Benjamin, Department of Natural Science, San Jose State Teachers College, San Jose, California 1923

Pirnie, Dr. Miles David, W. K. Kellogg Bird Sanctuary, Battle Creek, Michigan 1928
Poor, Hustace Hubbard, 112 Park Ave., Yonkers, New York 1935
Pough, Richard Hooper, 144 E. 45th St., New York, New York 1938
Preble, Edward Alexander, 3027 Newark St., Washington, D.C. 1929
Presnall, Clifford Charles, 5315 Earlston Dr., Washington, D.C. 1930
Prill, Dr. Albert G., Main St., Scio, Oregon 1933
Pueschel, Paul, 520 Drexel Ave., Glencoe, Illinois 1939
Pyle, George W[inner], Box 647, Berwyn, Pennsylvania 1939
Quillian, Marvin C., Wesleyan College, Macon, Georgia 1927
Randall, Mrs. W. S., Alamo Natl. Bldg., San Antonio, Texas 1925
Reeder, Miss Clara Maude, 318 College Ave., Houghton, Michigan 1938
Riley, Joseph Harvey, U. S. National Museum, Washington, D.C. 1914
Rogers, Mrs. Walter E., 911 E. North St., Appleton, Wisconsin 1931
Rust, Henry Judson, Box 683, Coeur d'Alene, Idaho 1921
Satterthwait, Mrs. Elizabeth Allen, 806 W. Ohio St., Urbana, Illinois..... 1925
Saunders, Dr. George Bradford, 562 Custom House, Denver, Colorado 1926
Saunders, William Edwin, 352 Clarence St., London, Ontario, Canada 1902
Savage, James, Buffalo Athletic Club, Buffalo, New York 1939
Schorger, Dr. Arlie William, 168 N. Prospect Ave., Madison, Wisconsin 1927
Scott, Dr. John W[illiam], Department of Zoology, University of Wyoming, Laramie, Wyoming 1937
Scott, Thomas George, Department of Zoology, Science Bldg., Ames, Iowa... 1936
Selko, Lyle F[rederick], Games and Fish Department, Oklahoma City, Oklahoma 1939
Shaffer, Chester Monroe, Romney, West Virginia 1934
Sharp, Dr. Ward M., Valentine Lakes Waterfowl Refuge, Valentine, Nebraska. 1936
Shelford, Dr. Victor Ernest, Vivarium Bldg., Wright and Healey Sts., Champaign, Illinois 1931
Smith, Professor Frank, 79 Fayette St., Hillsdale, Michigan 1910
Smith, Frank Rush, Route 2, Box 100, Laurel, Maryland 1930
Smith, Harry Madison, 2007 Calumet Ave., Whiting, Indiana 1936
Smith, Roy Harmon, 183 N. Prospect St., Kent, Ohio 1936
Spears, Joseph F., 355 S. Broadway, Lexington, Kentucky 1939
Stebbins, Miss Fannie Adell, 31 Ely Ave., West Springfield, Massachusetts.... 1936
Stegeman, Miss Thelma Isis, 1308 Geddes Ave., Ann Arbor, Michigan 1938
Stevenson, Bernard H., 2117 Woodford Ave., Ft. Myers, Florida 1938
Stillwell, Jerry E., 7460 San Benito Way, Route 4, Dallas, Texas 1935
Stoner, Dr. Dayton, New York State Museum, Albany, New York 1912
Suthard, James Gregory, 1878½ Junipero Ave., Long Beach, California..... 1936
Swanson, Dr. Gustav [Adolph], Division of Economic Zoology, University of Minnesota, University Farm, St. Paul, Minnesota 1927
Taft, Miss Elizabeth A., 1132 N. Alabama St., Indianapolis, Indiana..... 1937
Taylor, Dr. Aravilla Meek, Lake Erie College, Painesville, Ohio 1936
Taylor, Walter Penn, 254 Faculty Exchange, College Station, Texas 1937
Thacker, Miss [Lillian] Maxine, Route 3, Buckhannon, West Virginia 1938
Thomas, Edward Sinclair, 1116 Madison Ave., Columbus, Ohio 1921
Thomas, Mrs. Rowland, Route 4, North Little Rock, Arkansas 1937
Tift, Richard, Madison Terrace Apts., Albany, Georgia 1937
Tinker, Almerin David, 519 Oswego St., Ann Arbor, Michigan 1909
Tomkins, Ivan Rexford, U. S. Dredge Morgan, Savannah, Georgia 1931
Townsend, Miss Elsie White, Wayne University, Detroit, Michigan 1938
Tracy, Ernest B., Ferris Hill, New Canaan, Connecticut 1937
Turner, Lovett T., Caliente, Nevada 1938
Turner, Miss Ruth D[ixon], 163 Forest St., Melrose, Massachusetts 1939

Tyler, Dr. Winsor Marrett, 1482 Commonwealth Ave., Brighton, Massachusetts 1914
van Rossem, A. J., California Institute of Technology, Pasadena, California.. 1939
Van Tyne, Dr. Josselyn, Museum of Zoology, University of Michigan, Ann Arbor, Michigan 1922
Vaughan, William Coleman, 591 Ashland Ave., Buffalo, New York 1938
Wagner, Fritz, Jr., 384 Hawthorne Lane, Winnetka, Illinois 1938
Walker, Dr. Charles F., Stone Laboratory, Put-in-Bay, Ohio 1939
Walker, Miss Wilda A., Zion-Bryce Nat'l History Association, Zion National Park, Utah 1938
Walkinshaw, Dr. Lawrence Harvey, 1416½ W. Michigan Ave., Battle Creek, Michigan 1928
Warren, Edward Royal, 1511 Wood Ave., Colorado Springs, Colorado 1911
Weber, Orlando Franklin, Jr., Mt. Kisco, New York 1936
Wetmore, Dr. Alexander, U. S. National Museum, Washington, D.C. 1903
Weydemeyer, Winton, Fortine, Montana 1930
White, Francis Beach, St. Paul's School, Concord, New Hampshire 1926
Wilson, Archie Francis, 1921 Lake Ave., Whiting, Indiana 1937
Wilson, Gordon, 1434 Chestnut St., Bowling Green, Kentucky 1925
Wing, Leonard William, Washington State College, Pullman, Washington.... 1924
Wood, Dr. Casey Albert, Wood Library of Ornithology, McGill University, Montreal, Canada 1924
Worth, Dr. C[harles] Brooke, Department of Zoology, Swarthmore College, Swarthmore, Pennsylvania 1938
Wyman, Miss Mary May, 1040 Mary St., Louisville, Kentucky 1940
Yeatter, Ralph Emerson, Illinois Natural History Bldg., Urbana, Illinois 1932
Zimmerman, Harold Alexander, 2522 W. Jackson, Muncie, Indiana 1932

Associate Members

Adams, I. C., Jr., 1600 Hinkson St., Columbia, Missouri 1933
Adelson, Richard Henry, 34 Wensley Dr., Great Neck, L.I., New York 1938
Ahrens, Carsten, 5th Ave. High School, Pittsburgh, Pennsylvania 1938
Aitkin, Andrew Drummond, Jr., % Stanolind Oil & Gas Co., Houston, Texas.. 1936
Alexander, Donald Child, 18 Hurd St., Lowell, Massachusetts 1937
Allan, Philip F[arley], 806 Bellview St., Amarillo, Texas 1939
Allen, Durward Leon, Rose Lake Wildlife Experiment Station, R.R. No. 1, East Lansing, Michigan 1933
Allen, Parks, Route 3, Ithaca, Michigan 1939
Allen, Robert Ward, Museum of Zoology, Ann Arbor, Michigan 1936
Allison, Malcolm N., U. S. Biological Survey, Box 869, Yuma, Arizona 1939
Alpert, Bernard, 170 Broadway, New York, New York 1939
Amadon, Dean, 318 W. 71st St., New York, New York..... 1935
Ammann, George Andrew, 610 W. Broad St., Chesaning, Michigan 1935
Amundson, Geno A., Valentine, Nebraska 1936
Anderson, Anders Harold, Route 5, Box 488, Tucson, Arizona 1937
Anderson, Harry George, 624 E. Green St., Champaign, Illinois 1940
Anderson, John M., Ohio Wildlife Research Station, Ohio State University, Columbus, Ohio 1938
Anderson, Dr. Rudolph Martin, Division of Biology, Department of Mines and Resources, National Museum of Canada, Ottawa, Ontario, Canada.. 1937
Anderson, Wallace L[owell], 223 7th St., Baraboo, Wisconsin 1939
Anthes, Clarence A., 713 Hamilton Ave., Waukesha, Wisconsin 1939
Appleton, John Sparhawk, Simi, California 1936
Atwood, Earl L. [Jr.], Lacassine Migratory Waterfowl Refuge, Lake Arthur, Louisiana 1939

Atzenhoefer, Daniel Raymond, 12 State St., Norwalk, Ohio 1939
Ault, Harold, Box 476, Fiatt, Illinois 1938
Austin, Dr. Oliver Luther, Tuckahoe, Westchester Co., New York 1930
Ayer, Mrs. Nathan Edward, 1300 Hillcrest Dr., Pomona, California 1936
Babcock, Mrs. Lester, 402 Madison Ave., Milton, Wisconsin 1936
Baerg, William J., University of Arkansas, Fayetteville, Arkansas 1924
Bailey, Mrs. Florence Merriam, 1834 Kalorama Rd., Washington, D.C. 1911
Bailey, Mrs. Mary L., 221 Sioux Apts., Sioux City, Iowa 1918
Baillie, James Little, Jr., Royal Ontario Museum of Zoology, Queens Park at Bloor St., Toronto, Ontario, Canada 1938
Baker, Bernard William, Marne, Michigan 1938
Baker, John Hopkinson, 1165 5th Ave., New York, New York 1930
Baker, Rollin Harold, Department of Geology, College Station, Texas 1938
Baker, William Calvin, 223 W. Pershing St., Salem, Ohio 1931
Baldwin, Donald D., Box 193, Fessenden, North Dakota 1939
Baldwin, John H., Route 2, Box 36A, Ludlow, Kentucky 1938
Baldwin, William Plews, Jr., Bull's Island, Awendaw, South Carolina 1938
Ballard, J. O., 5388 Waterman Ave., St. Louis, Missouri 1935
Barkalow, Frederick Schenck, Box 469, Auburn, Alabama 1936
Barnett, Miss Dorothy I., 3820 N. Newhall St., Milwaukee, Wisconsin 1933
Bartow, Mrs. Leslie W., 2420 Homestead Place, Cincinnati, Ohio 1938
Batchelder, C. F., 7 Kirkland St., Cambridge, Massachusetts 1927
Bates, Miss Clara, Fort Pierce, Florida 1939
Baumgartner, Dr. Frederick Milton, Department of Entomology, A. & M. College, Stillwater, Oklahoma 1935
Baumgartner, Luther M., Ohio Wildlife Research Station, Ohio State University, Columbus, Ohio 1936
Baumgartner, Dr. Milton D., 430 Buckingham Dr., Indianapolis, Indiana.....1938
Bay, J. C., % John Crerar Library, Chicago, Illinois 1939
Beatty, Harry Andrew, Christiansted, St. Croix, Virgin Islands, U.S.A.....1936
Becker, Miss Edna E[lizabeth], Hollins College, Virginia 1939
Beebe, Ralph, 353 Salliotte St., Ecorse, Michigan 1924
Beeghly, James Leon, 46 Woodview Ave., Youngstown, Ohio 1933
Behle, William Harroun, Department of Biology, University of Utah, Salt Lake City, Utah 1935
Belcher, Paul Eugene, 988 Jefferson Avenue, Apt. 3, Akron, Ohio 1938
Bell, Glenn W., 727 Cherokee Ave. S.E., Atlanta, Georgia 1939
Bellrose, Frank, Jr., 1220 W. Madison St., Ottawa, Illinois 1935
Benchley, Edwin Allen, Jr., 642 Worcester St., Wellesley, Massachusetts 1937
Benedict, Mrs. Howard Smith, 24724 Oakland Rd., Bay Village, Ohio 1926
Bennett, Logan Johnson, 1-A Horticulture Bldg., Pennsylvania State College, State College, Pennsylvania 1934
Benson, Dr. Seth Bertram, 645 Coventry Rd., Berkeley, California 1930
Birkeland, Henry, Roland, Iowa 1934
Bissland, Howard Ross, Los Robles St., Tallahassee, Florida 1940
Bissonnette, T[homas] Hume, Trinity College, Hartford, Connecticut 1939
Black, Charles Theodore, Rose Lake Wildlife Experiment Station, Route 1, East Lansing, Michigan 1935
Bodine, Miss Margaret Lamb, Rittenhouse Plaza, 19th and Walnut Sts., Philadelphia, Pennsylvania 1930
Bond, Richard Marshall, 6608 Chabot Rd., Oakland, California 1936
Bordner, Mrs. Frances Comfort, Hudson, Iowa 1930
Borell, A. E., Soil Conservation Service, Albuquerque, New Mexico 1936
Borror, Dr. Donald Joyce, Department of Zoology and Entomology, Ohio State University, Columbus, Ohio 1927
Bowdish, Beecher Scoville, Demarest, New Jersey 1924

Bradley, Homer L., Chautauqua Refuge, Havanna, Illinois 1939
Braun, Howard Wylie, 1413 Louisiana Ave. N.W., Canton, Ohio 1937
Braund, Frank William, 1022 Central Ave., Cleveland, Ohio 1935
Brecher, Leonard C[harles], 1900 Spring Dr., Louisville, Kentucky 1939
Brigham, Edward Morris, Jr., Kingman Memorial Museum, Battle Creek, Michigan 1938
Brignac, Miss Rita, Forest, Mississippi 1939
Brooks, Alonzo Beecher, Oglebay Park, Wheeling, West Virginia 1931
Broun, Maurice, Rt. 1, Orwigsburg, Pennsylvania 1935
Brown, Clarence D., 222 Valley Rd., Montclair, New Jersey 1938
Buchanan, Borden Campbell, 100 S. Cecilia St., Sioux City, Iowa 1937
Bujak, Boleslaus Joseph, Museum of Zoology, Ann Arbor, Michigan 1936
Burland, Lee J[ohnson], Ballston Lake, New York.....1939
Burt, Dr. William Henry, Museum of Zoology, Ann Arbor, Michigan 1928
Buss, Irven Otto, 316 N. Mills St., Madison, Wisconsin 1936
Cahalane, Victor Harrison, Wildlife Division, National Park Service, Washington, D.C. 1933
Calhoun, John Bumpass, Zoology Laboratory, Northwestern University, Evanston, Illinois 1935
Calvert, Earl Wellington, Haliburton P. O., Ontario, Canada 1937
Campbell, Louis Walter, 848 Toronto Ave., Toledo, Ohio 1926
Campbell, Miss Mildred Florence, 29 N. Hawthorne Lane, Indianapolis, Indiana 1938
Capps, Beryl F[ranklin], 4921 Euclid, Kansas City, Missouri 1939
Carlson, Carl Olof, Department of Biology, Doane College, Crete, Nebraska..1923
Carpenter, John Richard, 2670 N. Alpine Rd., Grand Rapids, Michigan 1934
Carrothers, Miss Vera, 14704 Alder Ave., E. Cleveland, Ohio 1938
Carter, John Darlington, Lansdowne, Pennsylvania 1930
Cartwright, Bertram William, 238 Guilford St., Deer Lodge, Winnipeg, Canada.1930
Case, Leslie Delos, Sr., 714 W. Madison St., Ann Arbor, Michigan 1938
Chamberlain, Glen David, 22 Academy St., Presque Isle, Maine 1930
Chapman, Floyd Barton, 1944 Denune Ave., Columbus, Ohio 1932
Chutter, Miss Mildred C., Box 229, Athens, Ohio 1936
Clark, Anthony Morris, 490 E. Abington Ave., Chestnut Hill, Philadelphia, Pennsylvania 1939
Clark, Sheldon, Rainbow Farm, Barrington, Illinois 1939
Clarke, Dr. Charles Henry Douglas, Department of Mines and Resources, Mines and Geology Branch, National Museum of Canada, Ottawa, Ontario, Canada 1932
Clay, Miss Marcia Barnes, Bristolville, Ohio 1924
Clout, George John, 89 North St., St. Catherines, Ontario, Canada 1935
Clow, Miss Marion, Box 163, Lake Forest, Illinois 1929
Cole, Harry Maurice, 3016 Capitol Ave., Cheyenne, Wyoming 1935
Coles, Victor, 2910 Grasselli Ave., Cincinnati, Ohio 1929
Compton, Lawrence Verlyn, Soil Conservation Service, Box 1348, Albuquerque, New Mexico 1923
Conrad, Charles Louis, 423 Warwood Ave., Wheeling, West Virginia 1937
Conway, Albert E., Box 135, West Chester, Pennsylvania.....1939
Cooley, Miss Eleanor Graham, R.F.D., Berwyn, Maryland 1936
Cooney, Robert F., U. S. Forest Service, Augusta, Montana 1940
Counce, Howard, Counce, Tennessee 1940
Crabb, Wilfred D[ayton], Salix, Iowa 1937
Crane, Alvin Hugh, 1019 E. Harrison St., Guthrie, Oklahoma 1939
Crook, Compton N., Jr., State Teachers College, Towson, Maryland 1929
Cummings, William M[elville], 1012 Capital Ave., St. Paul, Minnesota 1939
Cunningham, James W., 4425 Main St., Kansas City, Missouri 1935

Currier, Edmonde Samuel, 8541 N. Chicago Ave., Portland, Oregon 1930
Curtis, Miss Elizabeth Long, 5648 Beach Dr., Seattle, Washington 1935
Dahlberg, Wendell [Oscar], 11312 S. Michigan Ave., Chicago, Illinois 1939
Dalke, Dr. Paul David, Division of Wildlife Research, Missouri Cooperative Wildlife Research Unit, Columbia, Missouri 1936
Damon, David, 724 6th St., Ames, Iowa 1933
Dana, Edward F[ox], 57 Exchange St., Portland, Maine 1939
Danner, Mrs. John M., 1646 Cleveland Ave. N.W., Canton, Ohio 1921
Davidson, William Mark, National Research Center, Beltsville, Maryland....1933
Davis, George, State Teachers College, Murfreesboro, Tennessee 1936
Davis, Mrs. Louie Irby, Box 988 or 1009 Johnson St., Harlingen, Texas 1933
Davis, Dr. William B., Department of Wild Game, College Station, Texas....1938
Davison, Verne E[lbert], 531 Poplar St., Spartanburg, South Carolina 1939
Dear, Lieut. Col. L[ionel] S[extus], Box 127, Port Arthur, Ontario, Canada..1939
Debes, Victor Albert, 1211 Folsom Ave., Prospect Park, Pennsylvania 1937
Dechen, Mrs. Lillian Orvetta, 14 Sumner St., Binghamton, P. O., Port Dickinson, New York 1939
Dempsey, G. H., Elmhurst Hall, The University, Reading, Berkshire, England.1940
Deusing, Murl, 142 N. 75th St., Milwaukee, Wisconsin 1937
Devitt, Otto Edmund, 31 Willowbank Blvd., Toronto, Ontario, Canada 1935
Dickinson, J[oshua] C[lifton], Jr., 1351 W. Arlington St., Gainesville, Florida.1939
Dille, Frederick Monroe, 822 Grand Ave., Nogales, Arizona.....1912
Dingle, Edward von Seibold, Huger, South Carolina 1921
Dixon, James B., R.D. 1, Box 688, Escondido, California 1936
Dockham, Verne, Mio, Michigan 1940
Dole, J. Wilbur, 51 E. Stone St., Fairfield, Iowa 1930
Dolley, John Seiver, 626 E. Ferguson St., Woodriver, Illinois 1937
Domm, Dr. Lincoln Valentine, Whitman Laboratory for Experimental Zoology, University of Chicago, Chicago, Illinois 1936
Doughty, Jacob P[hinizy], 1289 Willow Ave., Louisville, Kentucky 1940
Drum, Miss Margaret, Owatonna, Minnesota 1937
DuMond, Mrs. Margaret, 2415 Elmwood Dr. S.E., Grand Rapids, Michigan..1939
Duncan, Mrs. Dorothy Dodge, Eaton's Ranch, Wolf, Wyoming 1939
Duncan, Mott Robert, 3796 S. Galapago St., Box 115, Englewood, Colorado..1939
Durham, Miss Shirley Rhea, Sans Souci, Apt. D., Paducah, Kentucky 1939
Dyer, Mrs. Minnie M., Byington, Tennessee 1930
Eastwood, Sidney Kingman, 301 S. Winebiddle Ave., Pittsburgh, Pennsylvania.1928
Ebersole, Frank Boyd, 1656 Richardson St., Fort Wayne, Indiana 1937
Eckelberry, Donald [Richard], 133 W. Indiana Ave., Sebring, Ohio.....1938
Elder, William Hanna, Biology Bldg., University of Wisconsin, Madison, Wisconsin 1938
Eliot, Samuel Atkins, Jr., 32 Paradise Rd., Northampton, Massachusetts 1932
Emerson, David L[owell], 25 Everett Ave., Providence, Rhode Island 1939
Emlen, Dr. John Thompson, Jr., College of Agriculture, Davis, California....1936
Empey, Miller, Freeland, Michigan 1939
Erickson, Arnold Burton, Division of Economic Zoology, University Farm, St. Paul, Minnesota 1938
Erickson, Miss Mary Marilla, Santa Barbara State College, Santa Barbara, California 1930
Evans, Dr. Evan Morton, 550 Park Ave., New York, New York 1929
Eynon, Alfred Ernest, 107 Halsey St., Newark, New Jersey 1938
Fales, John H[ouse], 1211 East St., Silver Spring, Maryland 1939
Fall, Mrs. Mark H., 314 College Ct., Albion, Michigan 1939
Fautin, Reed Winget, Route 2, Box 307, Provo, Utah 1937
Feighner, Miss Lena Veta, 298-I S. Tremont St., Kansas City, Kansas 1935

Felton, W. R., 1709 Summit St., Sioux City, Iowa 1934
Ferrie, Robert Morris, Box 277, North Battleford, Saskatchewan, Canada....1940
Finster, Miss Ethel Beulah, Asheville Teachers College,
Asheville, North Carolina 1930
Fleetwood, Raymond Judy, Piedmont Wildlife Refuge, Round Oak, Georgia..1934
Flentge, Louis George, 1564 Thacker St., Des Plaines, Illinois 1936
Floyd, E[arl] Pershing, 414 North Hervey St., Hope, Arkansas.....1939
Foote, Maurice Edwin, Apt. 2, 207 Beecher St., Ravenna, Ohio 1932
Force, Miss Edith Rhoda, 3021 E. 8th St., Tulsa, Oklahoma 1931
Ford, Edward Russell, Newaygo, Michigan 1914
Forsyth, Miss Louise [Ann], Lebanon Rd., Hanover, New Hampshire 1940
Fox, Adrian Caspar, Box 593, Mandan, North Dakota 1937
Freeman, Robert M., Route 5, Laurel, Mississippi 1939
Frei, Mrs. F. Everett, 202 Leslie Ave., Glasgow, Kentucky 1939
Friauf, James J., University of Florida Conservation Reserve, Welaka, Florida.1936
Frothingham, Mrs. Randolph, 56 Sargent Crossway, Brookline, Massachusetts.1932
Frye, Ozro Earle, Jr., Alabama Cooperative Wildlife Research Unit,
Auburn, Alabama 1940
Fryklund, P. O., Roseau, Roseau Co., Minnesota 1926
Furniss, Owen Cecil, 2203 1st Ave., West Prince Albert,
Saskatchewan, Canada 1934
Furth, John [Thomas], 436 Felton Ave., Highland Park, New Jersey 1939
Gensch, Robert H[enry], Division of Wildlife Research, Bureau of
Biological Survey, Washington, D.C. 1939
George, John L[othar], % J. Van Tyne, Museum of Zoology,
Ann Arbor, Michigan 1939
Gerstell, Richard, Pennsylvania Game Commission, Harrisburg, Pennsylvania..1939
Gier, Dr. Herschel Thomas, Ohio University, Athens, Ohio 1937
Gifford, Dr. Harold, 323 S. 51st Ave., Omaha, Nebraska 1936
Gilfillan, Merrill C[larence], Box 626, Jefferson, Ohio 1939
Gill, Geoffrey [Trafford Holmes], 24 Overlook Dr., Huntington,
Long Island, New York 1934
Gillett, Francis C., Box 1269, Omaha, Nebraska 1935
Gillette, Miss Fredericka B., 1319 Forest Ave., Ann Arbor, Michigan.....1938
Gilligan, James P[ersh], 201 N. Thayer St., Ann Arbor, Michigan 1938
Gillham, Charles Edward, Edwardsville, Illinois 1939
Giltz, Maurice L[eroy], Sparta, Ohio 1939
Girard, George L[ycurgus], 710 E. 3rd, Casper, Wyoming 1939
Glenn, Robert W., 509 Orchard Ave., Avalon, Pittsburgh, Pennsylvania 1934
Goldsmith, Glenn Warren, Box 1611, University Station, Austin, Texas 1931
Good, Ernest E[ugene], Soil Conservation Service, Cambridge, Ohio 1940
Goodnight, Clarence J[ames], 203 Vivarium, University of Illinois,
Champaign, Illinois 1939
Goslin, Robert Martin, 316 Wilson Ave., Columbus, Ohio 1936
Grant, Cleveland Putnam, 620 Greenup St., Covington, Kentucky 1928
Green, Mrs. David B., 6417 Warren Ave., Minneapolis, Minnesota 1940
Green, William E., Jr., Refuge Manager, Box 269, Winona, Minnesota 1939
Greene, Earle Rosenbury, Okefenokee Wildlife Refuge, Fargo, Georgia 1930
Greenfield, Miss Myrtle, 1812 E. Silver St., Albuquerque, New Mexico 1940
Greenhalgh, Clifton M., 1230 E. 1st St. S., Salt Lake City, Utah 1939
Gresham, Albert Burton, 34 Gaspe Annex, Winnipeg, Manitoba, Canada 1934
Griggs, Julian G[ladden], 922 S. State St., Ann Arbor, Michigan 1939
Grinnell, Lawrence I[rving], 1024 Stewart Ave., Ithaca, New York 1939
Grose, E. R., Glenville, West Virginia 1939
Groskin, Horace, 210 Glenn Rd., Ardmore, Pennsylvania 1937

Gross, Dr. Alfred Otto, Bowdoin College, Brunswick, Maine 1927
Gross, Miss Margaret Edith, Route 5, Grand Rapids, Michigan 1937
Guthrie, Frank Keller, Keuka Park, New York 1938
Haak, A[drion], 437 Eugenie St., St. Boniface, Manitoba, Canada 1939
Hadley, Miss Theodosia Hamilton, Western State Teachers College, Kalamazoo, Michigan 1938
Hagar, Mrs. Jack, Rockport, Texas 1930
Hague, Dr. Florence S., Sweet Briar College, Sweet Briar, Virginia 1931
Hainsworth, William Pickard, 214 Railroad Ave., North Andover, Massachusetts 1930
Hairston, Nelson G[eorge], Zoology Department, Northwestern University, Evanston, Illinois 1940
Haller, Frank D[enver], Ohio Wildlife Research Station, Ohio State University, Columbus, Ohio 1940
Haller, Karl William, Route 1, Short Creek, West Virginia 1934
Hallman, Roy Cline, Box 826, Panama City, Florida 1928
Hamilton, Dr. William John, Jr., Department of Zoology, Cornell University, Ithaca, New York 1933
Hammond, Merrill C[lyde], Lower Souris Refuge, Upham, North Dakota..1939
Hanna, Wilson Creal, 141 E. F St., Colton, California 1936
Hanson, Harold C[arsten], 3658 N. Harding Ave., Chicago, Illinois 1939
Harford, Dr. Henry Minor, 1034 Argyle Bldg., Kansas City, Missouri 1938
Harper, Dr. Francis, 224 S. Chester Rd., Swarthmore, Pennsylvania 1930
Harris, Mrs. Hugh H., Emory University, Atlanta, Georgia 1939
Hatton, Adrian B[ernard], 100 College Ave., Columbia, Missouri 1940
Hausler, Mrs. M., 7348 Paxton Ave., Chicago, Illinois 1936
Hawkins, Arthur S., Illinois Natural History Survey, Urbana, Illinois 1936
Hawkins, B. L., Hamline University, St. Paul, Minnesota 1936
Hay, Alan Gene, 432 N. 3rd St., Douglas, Wyoming 1939
Hayward, C. Lynn, Department of Entomology and Zoology, Brigham Young University, Provo, Utah 1933
Hedges, R. Frank, Box 1348, Soil Conservation Service, Albuquerque, New Mexico 1939
Heiser, J[oseph] M[atthew], Jr., 1724 Kipling St., Houston, Texas.....1939
Helfer, Miss Louise, 111 9th St., Watkins Glenn, New York 1937
Hellwig, Miss Isabelle, 3080 Essex Rd., Cleveland Heights, Ohio 1936
Henderson, Walter Cleaveland, 8 Magnolia Parkway, Chevy Chase, Maryland.1928
Henderson, [William] Grant, Route 6, Greensburg, Indiana 1930
Henika, Franklin S., 2212 A 17th St., Lubbock, Texas 1936
Henry, Cordia John, Box 37, Upham, North Dakota 1933
Herrick, Miss Eleanor Elizabeth, 935 Smith Lane, Woodmere, Long Island, New York 1935
Hickey, Joseph J., % The Edison Co., 4 Irving Place, New York, New York.1940
Hiett, Lawrence Davison, 2134 Parkwood Ave., Toledo, Ohio 1929
Hill, Herbert Oliver, 329 Summitt Ave., Redlands, California 1938
Hill, Julian Werner, 1106 Greenhill Ave., Wilmington, Delaware 1935
Hillmer, Davis B., 448 W. Ferry Ave., Detroit, Michigan 1926
Hilton, Dr. David Clark, 305 Richards Bldg., Lincoln, Nebraska 1918
Hinchman, Richard May, 75 Fairbanks Rd., Milton, Massachusetts 1931
Hobson, Mrs. L. G., 1512 N. Meridan St., Route 9, Indianapolis, Indiana....1935
Hochbaum, Hans Albert, Delta, Manitoba, Canada 1940
Hoffmeister, Linus C[hristian], 3700 Hoffmeister Ave., Lemay, Missouri....1939
Holland, Harold May, Box 615, Galesburg, Illinois 1915
Holt, Ernest Goslan, 2000 F. St. N.W., Washington, D.C. 1926
Hostetter, D. Ralph, Eastern Mennonite School, Harrisonburg, Virginia.....1937

Howell, Joseph Corwin, Laboratory of Ornithology, Cornell University, Ithaca, New York 1938
Howell, Louis Moffitt, Route 1, Box 433, Jacksonville, Florida 1938
Hoyt, John Southgate Yeston, 5 Lewis St., Lexington, Virginia 1936
Hubbard, Hugh W[ells], American Board Mission, Paoting, Hopei, China....1939
Huggins, Russell Arno, Biology Department, Western Reserve University, Cleveland, Ohio 1937
Huggitt, Floyd C., Bellevue, Michigan 1933
Hughes, George Thomas, Box 153, Plainfield, New Jersey 1929
Hulbert, Lloyd Claire, 529 W. Grand River Ave., East Lansing, Michigan...1938
Hull, Allan M., University of Colorado, Boulder, Colorado 1939
Hunter, Lawrence E., Hanna City, Illinois 1934
Hurley, John Beatty, 401 S. 17th Ave., Yakima, Washington 1937
Hutchens, Lynn H., 536 N. Harlem Ave., River Forest, Illinois 1939
Hyde, A. Sidney, Eastern Oregon College of Education, La Grande, Oregon..1939
Ijams, Henry Pearle, % News-Sentinel, Knoxville, Tennessee 1924
Ingersoll, Albert Mills, 908 F St., San Diego, California 1921
Jaques, F[rancis] L[ee], American Museum of Natural History, New York, New York 1939
Jelier, Franciscus Peter, Groote Visscherystraat 19[A], Rotterdam, Holland....1931
Jenkins, James H[obart], Wildlife Research Station, Ohio State University, Columbus, Ohio 1939
Jensen, Miss [Ellen] Irene, 3539 22nd Ave. S., Minneapolis, Minnesota....1939
Jensen, Jesse Peter, Box 364, Dassel, Minnesota 1926
Jessman, Miss Lena M., 1250 Hubbard St., Detroit, Michigan 1935
Johnson, Frank, Y.M.C.A., South Bend, Indiana 1935
Johnson, Mrs. Irene W., 38 Portland Place, St. Louis, Missouri 1931
Johnson, Paul H., Soil Conservation Service, Bethany, Missouri 1936
Johnson, William M[cNutt], 108 E. Depot St., Knoxville, Tennessee....1939
Jones, Howard A., Route 3, Fenton, Michigan 1938
Jones, John Courts, 3224 19th St. N.W., Washington, D.C. 1931
Jones, Paul F., Route 7, Box 443, Toledo, Ohio 1937
Jones, Solomon Paul, 509 West Ave. N., Waukesha, Wisconsin 1921
Jones, Victor Emmons, University of Idaho, Southern Branch, Pocatello, Idaho 1938
Jurica, E., Lisle, Illinois 1940
Kahn, David C[urry], 1122 Michigan Ave., Ann Arbor, Michigan 1938
Kahn, Mrs. Dina Hope, 1122 Michigan Ave., Ann Arbor, Michigan 1938
Kain, Allan, 3611 Shaw Ave., Cincinnati, Ohio 1939
Kamm, Mrs. Oliver, 365 Lake Shore Dr., Grosse Pointe Farms, Michigan....1934
Katz, David, Ohio Wildlife Research Station, Ohio State University, Columbus, Ohio 1938
Kellogg, Dale Cosnett, Box 343, Norwalk, Ohio 1932
Kelly, Mrs. George A., 2300 La Salle Gardens N., Detroit, Michigan 1935
Kennedy, H. N., Box 294, Rosslyn Station, Arlington, Virginia 1924
Kindler, Mrs. Grace Emma, Sheridan Dr., Lancaster, Ohio 1937
Kinslow, Miss Hazel K., Sans Souci, Apt. D, Paducah, Kentucky 1939
Kirk, Allan D[ixon], 14 Forest Hill Rd., Wilkinsburg, Pennsylvania 1939
Knapp, Elmer Leslie, Route 2, Troy, Pennsylvania 1930
Knight, Charles Harold, 4157 E. 113th St., Cleveland, Ohio 1939
Knox, Miss Margaret Richardson, 4030 Park Ave., Indianapolis, Indiana....1937
Kobes, Karl George, Bureau of Biological Survey, Holt, Minnesota 1938
Koch, Peter, Terrace Park, Ohio 1939
Koestner, E. J., 203 Vivarium Bldg., University of Illinois, Champaign, Illinois 1938

Kolb, Charles Haven, Jr., 5210 Catalpha Rd., Baltimore, Maryland 1937
Kosten, John Leonard, 967 Pine Ave. N.W., Grand Rapids, Michigan 1939
Kramer, Theodore Christian, Department of Anatomy, East Medical Bldg., Ann Arbor, Michigan 1939
Kriebel, Ralph Meschter, 1111 N. St., Bedford, Indiana 1935
Kuitert, Louis Cornelius, 1134 Ohio St., Lawrence, Kansas 1938
Lacey, Miss Mifton H., No. 9 Ling Bldg., Canton, Ohio 1939
LaFollette, James E[dmund], 1122 Barret Ave., Louisville, Kentucky 1939
Laidlaw, A[lan] F., Soil Conservation Service, Eau Claire, Wisconsin 1939
Laird, Miss Lonnie, 3664 Washington St., St. Louis, Missouri 1935
Lay, Daniel Wayne, Box 1056, Lufkin, Texas 1939
Lay, George Balch, 1140 Park Square Bldg., Boston, Massachusetts 1938
Lea, Robert B., Carleton College, Northfield, Minnesota 1940
Lee, Robert E., Soil Conservation Service, Shenandoah, Iowa 1936
Leedy, Charles A., 343 Falls Ave., Youngstown, Ohio 1927
Leedy, Daniel L., Ohio Wildlife Research Station, Ohio State University, Columbus, Ohio 1936
Legg, William C[larence], Mt. Lookout, West Virginia 1939
Lehmer, Clayton B[ruce], Utah Cooperative Wildlife Research Unit, Logan, Utah 1939
Lewis, Dr. Harrison Flint, Lands, Parks and Forest Branch, Department of Mines and Resources, Ottawa, Ontario, Canada 1939
Lewis, Merriam Garretson, Box 549, Salem, Virginia 1930
Lindsey, Dr. Alton Anthony, Department of Biology, American University, Washington, D.C. 1936
Link, Rev. George M., Grafton, Illinois 1939
Linsdale, Dr. Jean Myron, Jamesburg Route, Monterey, California.....1928
Little, Dr. Ethel Esther, State Teachers College, Minot, North Dakota 1937
Lloyd, C. K., 11 N. Elm St., Oxford, Ohio 1925
Lloyd, Hoyes, 582 Mariposa Ave., Rockcliffe Park, Ottawa, Ontario, Canada..1922
Lodge, William Ralph, Silver Lake Estates, Route 2, Cuyahoga Falls, Ohio..1935
Long, Wilbur Stuart, U. S. Soil Conservation Service, Salt Lake City, Utah..1936
Long, William H., Department of Poultry Husbandry, Cornell University, Ithaca, New York 1939
Lord, Dr. Frederic P[omeroy], 39 College St., Hanover, New Hampshire....1939
Lovell, Harvey B., 3011 Meade Ave., Route 3, Box 216, Louisville, Kentucky.1936
Low, Seth Haskell, Des Lacs Waterfowl Refuge, Kenmore, North Dakota ...1931
Lowery, George Hines, Jr., Museum of Zoology, Louisiana State University, University, Louisiana 1937
Lubin, Seymour I., 101 Chestnut St., Binghampton, New York 1934
Lum, Miss Elizabeth C[aroline], Cincinnatus, New York 1940
Lunk, William, Jr., Fleming Ave., Edgemont, Fairmont, West Virginia.....1937
Luthy, Ferd, Jr., 306 N. Institute, Peoria, Illinois 1937
Lynes, Miss Florence A., Cook Station, Missouri 1937
Mack, Horace Gordon, % Gilson Mfg. Co. Ltd., Guelph, Ontario, Canada....1937
Maclean, Miss Dorothy W[illiams], 21 Ashley St., Hartford, Connecticut 1939
MacLulich, Dr. Duncan Alexander, 144 Mavety St., Toronto, Ontario, Canada 1933
Magath, Dr. Thomas B., Mayo Clinic, Rochester, Minnesota 1935
Magney, Mrs. G. R., 5329 Washburn Ave. S., Minneapolis, Minnesota 1940
Maguire, Walter Stanley, Y.M.C.A., New Westminster, British Columbia ..1937
Main, John Smith, 2210 Van Hise Ave., Madison, Wisconsin 1936
Malley, Philip Patrick, Box B, Munhall, Pennsylvania 1935
Malley, Mrs. R. B., 418 W. 3rd St., Corsicana, Texas 1930
Malloy, Dr. James Patrick, Castalia, Iowa 1937
Manz, Frank J., Jr., 609 S. Water St., Northfield, Minnesota 1938

Markle, Dr. Millard S., 528 National Ave., Richmond, Indiana 1938
Marsh, Vernon L., Johnson Hall, University of Washington,
Seattle, Washington 1934
Maslowski, Karl Herbert, 1034 Maycliff Rd., Cincinnati, Ohio 1934
Mason, Robert French, Jr., 2415 California St. N.W., Washington, D.C.....1937
Mayer, Mrs. John N., 103 S. Miller St., Cynthiana, Kentucky 1935
Mayfield, Harold F[ord], 3311 Parkwood Ave., Toledo, Ohio 1940
Mayr, Dr. Ernst, American Museum of Natural History,
New York, New York 1933
McBeath, Donald Young, Midland Game Refuge, Sanford, Michigan 1936
McCann, Lester J., 3743 Emerson Ave. N., Minneapolis, Minnesota 1939
McConnell, Miss Mary Lou[ise], 151 Center Ave., Emsworth, Pennsylvania..1940
McCullough, George W., 4858 Lyndale Ave., Minneapolis, Minnesota 1937
McGraw, Harry A., 1600 5th Ave., Altoona, Pennsylvania 1936
McMurray, Arthur, 2110 Jones Ave., Nashville, Tennessee 1939
McMurry, Frank B[ailey], Wichita Mountains Wildlife Refuge,
Cache, Oklahoma 1939
McNeil, Dr. Charles Andrew, 111 W. 4th St., Sedalia, Missouri 1914
McNish, Edgar Mann, Madison, Tennessee 1940
Means, Amos Isaiah, Atwood, Illinois 1938
Meier, Henry Adams, 17 S. Normal St., Ypsilanti, Michigan 1940
Mellinger, E. O., North Lima, Ohio 1939
Meltvedt, Burton W., Paullina, Iowa 1930
Mendall, Howard L., 28 Pendlton St., Brewer, Maine 1936
Mendenhall, Eugene W., 97 Brighton Rd., Columbus, Ohio 1932
Merriam, Dr. Clinton Hart, 2590 Cedar St., Berkeley, California 1937
Michaud, Howard H[enry], 1205 Kensington Blvd., Fort Wayne, Indiana...1938
Michener, Harold, 418 N. Hudson Ave., Pasadena, California 1926
Miller, Dr. Alden Holmes, Museum of Vertebrate Zoology,
Berkeley, California 1930
Miller, Douglas Scott, 122 Lawrence Ave. E., Toronto, Ontario, Canada.....1939
Miller, Henry C., 29 Sheridan Dr., Monroe, Michigan 1938
Miller, Dr. Loye Holmes, University of California at Los Angeles,
Los Angeles, California 1939
Miller, Robert Cunningham, California Academy of Sciences,
San Francisco, California 1935
Milnes, Miss Harriet Kernahan, 331 Gowen Ave., Philadelphia, Pennsylvania..1935
Mitchell, Harold Dies, 378 Crescent Ave., Buffalo, New York 1936
Moeran, E. H., 541 Brant River Rd., Yonkers, New York 1940
Mohr, Dr. Carl Otto, Illinois Natural History Survey, Urbana, Illinois.....1936
Monson, Gale, 1410 E. Helen, Tucson, Arizona 1933
Montagna, William [Guglielmo Trono], Cornell University, Laboratory of
Ornithology, Ithaca, New York 1937
Moore, Miss Dora, 60 E. Mulberry St., Athens, Ohio 1934
Moore, George A., Route 3, Stillwater, Oklahoma 1938
Moore, Mrs. Jeanette K., 106 Highland Ave., Ithaca, New York 1940
Moore, Robert Thomas, Route 1, Box 28A, Pasadena, California 1938
Moos, Louis M., 311 Wyoming St., Billings, Montana 1939
Morrill, Ralph E., 1217 Olivia Ave., Ann Arbor, Michigan 1936
Morrison, Kenneth Douglas, 3544 Colfax Ave. S., Minneapolis, Minnesota....1937
Morrissey, Thomas J[ustin], 921 Mississippi Ave., Davenport, Iowa 1939
Morse, Marius, 4031 40th Ave., Robbinsdale, Minnesota 1938
Mosby, Henry S., 922 Harrison St., Lynchburg, Virginia 1937
Mousley, William Henry, 4073 Tupper St., Westmount, Montreal,
Quebec, Canada ..... .1922
Mueller, Walter Josef, 3043 N. Prospect Ave., Milwaukee, Wisconsin 1936

Mullin, Miss Elizabeth, 203 S. Zitter Ave., Indianapolis, Indiana 1938
Munro, James Alexander, Okanagan Landing, British Columbia 1935
Munter, Capt. William Henry, U. S. Coast Guard, 550 Federal Bldg., Seattle, Washington 1933
Murie, Olaus Johan, Jackson, Wyoming 1934
Murphey, Dr. Eugene Edmund, 432 Telfair St., Augusta, Georgia 1935
Murray, Rev. Joseph James, Lexington Presbyterian Church, Lexington, Virginia 1931
Murray, Robert Bruce, 130 Ave. G., Weirton, West Virginia 1939
Nattinger, Mrs. Maude C., 405 S. Holden St., Warrensburg, Missouri 1938
Nelson, Arnold Lars, Bureau of Biological Survey, Washington, D.C. 1932
Nelson, Charles Ellsworth, Jr., 124 Oxford Rd., Waukesha, Wisconsin 1937
Nelson, Edwin L[ewis], 77 Adelaide Ave., New Brunswick, New Jersey 1939
Nelson, Miss Fredericka, 110 White St., East Boston, Massachusetts 1939
Nelson, Urban C., U. S. Soil Conservation Service, Chillicothe, Missouri 1939
Neptune, Ralph W[illis], 1496 Indianola Ave., Columbus, Ohio 1940
Nessle, James P., 1823 Barrows St., Toledo, Ohio 1936
Newcomb, Hugh Ross, General Delivery, Port Townsend, Washington 1939
Newton, Earl T[homas], 5500 College St., Kansas City, Missouri 1939
Nichols, L[eon] Nelson, 315 E. 68th St., New York, New York 1937
Nicholson, Dr. A[rnold] J[seph], Game, Fish & Oyster Commission, Austin, Texas 1939
Norris, Russell T[aplin], 1-A Horticulture Bldg., State College, Pennsylvania.1939
Norton, Arthur Herbert, Portland Society of Natural History, 22 Elm St., Portland, Maine 1934
Oberhansley, Frank Reid, Sequoia National Park, California 1939
Odum, Eugene Pleasants, Biological Research Division, Edmund Niles Huyck Preserve Inc., Rensselaerville, Albany Co., New York 1930
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Osborne, Ben Orville, 4104 Bunting St., Ft. Worth, Texas 1937
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Packard, Stanley E., Troy, Pennsylvania 1936
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Peasley, Mrs. Harold Raymond, 2001 Nash Dr., Des Moines, Iowa 1934
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Peters, Dr. Harold S., Route 1, Box 171, Charleston, South Carolina 1936
Peterson, Alfred, Box 201, Brandt, South Dakota 1931
Peterson, Mrs. Charles Emil, Madison, Minnesota 1936
Pickens, Dr. Andrew Lee, Paducah Junior College Library, Paducah, Kentucky 1927
Pinto, Herman T., Box 297, State College, New Mexico 1939

Pitelka, Frank Alois, Department of Zoology, University of California, Berkeley, California 1938
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Poncy, Robert, Lachenal 19, Geneva, Switzerland....1939
Porter, Thomas Wayne, 327 W. Water St., Oak Harbor, Ohio 1938
Potter, Julian Kent, 437 Park Ave., Collingswood, New Jersey 1915
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Price, Dr. John Basye, University of Oregon, Medical School, Department of Anatomy, Portland, Oregon 1931
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Smith, Wendell Phillips, Wells River, Vermont 1921
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Avenue Rd., Toronto 5, Ontario, Canada 1929
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Lewisburg, Pennsylvania 1940
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Manitoba, Canada 1937
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Storer, Dr. Tracy Irwin, Division of Zoology, University Farm,
Davis, California 1928
Street, Thomas M., Bottineau, North Dakota 1940
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Gatlinburg, Tennessee 1935
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Tanner, Orey, 5019 Constance St., New Orleans, Louisiana 1933
Taverner, Percy Algernon, National Museum of Canada, Ottawa,
Ontario, Canada 1925
Teachenor, Dix, 1020 W. 61st St., Kansas City, Missouri 1923
Terres, J[ohn] Kenneth, U. S. Soil Conservation Service, Federal Bldg.,
Utica, New York 1939
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Pittsburgh, Pennsylvania 1935
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Tonkin, George, 207 Federal Office Bldg., Des Moines, Iowa 1935
Trautman, Milton Bernhard, Stone Laboratory, Put-in-Bay, Ohio 1932
Travis, Bernard V., Box 655, New Smyrna Beach, Florida 1935
Trimble, Miss Ruth, Carnegie Museum, Pittsburgh, Pennsylvania 1935
Tubbs, Farley F., Game Division, Department of Conservation,
Lansing, Michigan 1935
Twomey, Dr. Arthur Cornelius, Carnegie Museum, Pittsburgh, Pennsylvania..1936
Uhler, Francis Morey, Bureau of Biological Survey, Washington, D.C. 1931
Vaiden, Meredith Gordon, Rosedale, Mississippi 1937
Vesall, David Bernard, Carlos Avery Nursery, Forest Lake, Minnesota 1940
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Watson, Don, Mesa Verde National Park, Colorado 1940
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Weingart, Vernon Rolland, Route 1, Kent, Ohio 1939
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Wells, Mrs. Rollo H., 3819 Zenith Ave. S., Minneapolis, Minnesota 1938
Weyl, Edward Stern, 6506 Lincoln Dr., Mt. Airy, Philadelphia, Pennsylvania.1927
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Williams, Robert White, Bureau of Biological Survey, Washington, D.C. 1926
Willis, Warren J., R.F.D., Canaan, Connecticut 1928
Willman, Harry Bowen, 206 S. McCullough St., Urbana, Illinois 1938
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Wilson, Harold Charles, Ephraim, Wisconsin 1938
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Woodward, Arthur Jason, 504 Kahkwa Blvd., Erie, Pennsylvania 1937
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Work, Mrs. Robert, Bosky Acres, Barrington, Illinois 1934
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Yeager, Lee E[mmett], Illinois Natural History Survey, Urbana, Illinois.....1939
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